Resourceful, creative, and committed: The day-to-day work of agricultural extensionists in Kenya

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ABSTRACT

Broadly, the role of public extension and advisory agents is to facilitate and support access to technical knowledge, information and technologies by farmers, farmer organisations and actors in the agricultural sector, through trainings and demonstrating appropriate technologies and innovations. This study challenges the view of extensionists as simply transferring technologies to farmers and has explored more broadly the day-to-day, lived experiences of extensionists. The research has focused on public extensionists who serve smallholder subsistence farmers who engage in diverse farming activities and are dispersed across a large geographical area. The research was completed using a qualitative case study research design, based on data collected through in-depth interviews, documents and participants' observations. It emerged from this research that over 80% of the extensionists in this case were locals, and knowledgeable of and known by the community. They were familiar with local livelihoods and political dynamics and, therefore, were strongly embedded in the community. Over 90% of the extensionists who participated in the study had been doing extension work for all their working lives. Extensionists emerged as having strong networks among actors in the local and national extension, and agricultural systems.

The extensionists' work emerged as a hybrid of a demand-supply driven extension system where they respond to direct farmer inquiries, as well as supply services to farmers in accordance with projects and government accountabilities and goals. This research highlights the extent to which much of what extensionists do in a developing country context in a government extension service, dominated by project work, is not directly working with farmers to service their needs. This research shows the huge extent of work undertaken by extensionists behind the scenes (referred to as back-office work) and the interconnectedness between activities extensionists do with farmers and what they do with other extension actors.

Primarily, the day-to-day work of extensionists included servicing smallholder farmers' needs and gathering solutions from multiple sources to contribute to addressing these needs. Extensionists emerged as resource brokers who glean, leverage, optimise, haggle, barter, piggyback, coach, lobby, and advocate for financial and physical resources to support their extension work and to support farmers. Extensionists negotiated and collaborated with farmers to translate, adapt, transfer, and implement farm technologies to meet farmers' contextual challenges. Extensionists worked to deliver on multiple projects and optimise project benefits for farmers within the project

timeline. The study shows that extensionists deliver on employment commitments as government employees and work to meet their expected Key Performance Indicators (KPIs) and work to maintain and build legitimacy in their roles as extensionists with government, local politicians, NGOs, and the wider community.

Extensionists leveraged on their networks to access information, knowledge, technologies, and physical and financial resources. A significant contribution of this study was the finding that extensionists are resource brokers and the illustration of the creativity and the amount of effort they put into resources financially and physically, their work, and for the farmers. A further contribution this research makes is to highlight that Kenyan extensionists work to maintain and build legitimacy of their role. While extensionists emerged as working with smallholder farmers to reduce the impact of and build resilience to climate change, there was no evidence of the way they work with farmers or the broader extension system. The work of extensionists is deeply embedded in the traditional designs and ways of doing extension. These research findings clearly show the extent of resourcefulness and creativity of extensionists and their ability to develop strategies to navigate the multiple demands and the accountabilities placed by farmers, the employer, projects, funding entities and other actors in the extension system. Resource brokering and networking emerged as key strategies which enable extensionists do what they do. These findings will inform education and extension policy on the training of extensionists to include imparting capabilities and skills about resource brokering as it is a significant part of their job. These results suggest the need for further studies which explore new, positive, and meaningful ways of engaging with farmers to assist them to learn and change as needed.

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ABBREVIATIONS

The following acronyms and abbreviations are used in the text:

ADSE	Anglican Development Services-Eastern
AGED	Agricultural Education and Extension
AI	Artificial Insemination
ASDSP II	Agricultural Sector Development Support Program Phase Two
CA	Conservation Agriculture
CBOs	Community-Based Organisations
CIDPS	County Integrated Development Plans
CSA	Climate Smart Agriculture
DANIDA	Danish International Development Agency
EU	European Union
FAO	Food and Agriculture Organisation
FIPS	Africa Farm Inputs Programs-Africa
FSR/E	Farming Systems Research and Extension
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GOK	Government of Kenya
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
ICIPE	International Centre for Insect Physiology and Ecology
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFAD	International Fund for Agricultural Development
KCDMS	Kenya Crops and Dairy Marketing Systems
KCEP-CRAL	Kenya Cereal Enhancement Programme-Climate Resilience Agricultural Livelihood
KEPHIS	Kenya Plant Health Inspectorate Service
KPIs	Key Performance Indicators
KRD	Kitise Rural Development
L	Lower
LH	Lower High
LM	Lower Medium
LWR	Lutheran World Relief
MESPT	Micro Enterprises Support Programme Trust
MTPs	Medium Term Plans
NARIG-P	National Agricultural and Rural Inclusive Growth Project

NASEP	National Agricultural Sector Extension Policy
NGO	Non-Governmental Organisation
OMO	Operation Mwolyo Out
RTI	Research Triangle Institute
SDGs	Sustainable Development Goals
SIDA	Swedish International Development Cooperation Agency
SIVAP	Small Scale Irrigation and Value Addition Project
T&V	Training and Visit approach
ToFs	Trainers of Farmers
UM	Upper Medium
USAID	United States Agency for International Development
VMGs	Vulnerable and Marginalized Groups
WAO	Ward Agricultural Officer

CHAPTER 1 INTRODUCTION

Agriculture is a key economic and social driver of development in Kenya and public agricultural extension is an integral policy tool used by the Government of Kenya to advance agricultural development to alleviate poverty, achieve food security, and promote economic growth. Agricultural extension outcomes rely heavily on agricultural extensionists who work with, and for, smallholder farmers in rural Kenya. This research focuses on the day-to-day work of agricultural extensionists and how they do what they do and why. The research provides valuable insights into the contribution extensionists make to development work in a developing country context, through their resourcefulness and creativity in the face of complex challenges, including climate change.

The research used a qualitative case study research design based on data collected through in-depth, semi-structured interviews of extensionists and key informants, and participant observation. Theoretically, the research is framed by innovation systems, and agricultural extension and advisory literature drawn from both research in developed and developing countries. The case study provides an empirical exploration of the experiences of these individual extensionists responsible for day-to-day delivery of extension services to farmers and working at the ward administrative level which is the lowest political administration unit.

This chapter, the first of seven, introduces the study by first describing the research context and background. The research aim and research question are then presented. The background and positioning of the doctoral researcher in relation to the research context and focus is then outlined before, finally, the structure of the thesis.

1.1 Research background and context

Agriculture is the predominant source of livelihood for over 80% of Kenya's rural population (Kenya National Bureau of Statistics, 2019). The sector further accounts for 75% of total employment and over 65% of exports (Ministry of Agriculture Livestock and Fisheries, 2017). One of the significant contributions of the sector is food and nutrition security for a population that was projected to reach 50 million by the end of 2019 (Kenya National Bureau of Statistics, 2018). The challenges facing the agricultural sector and, hence, shaping the work of agricultural extension and extensionists, are many, and climate change is recognised as the most significant for the sector. The Kenyan agricultural sector recorded a significant drop in growth between 2013-2015 (D'Alessandro, Caballero, Lichte, & Simpkin, 2015) mainly due to

drought and erratic rainfall. Between 83-89% of the country is arid and semi-arid, recording between 200-700mm of rainfall annually (Government of Kenya, 2017b, 2018). Agricultural production is still predominantly rain-fed and, as a result, highly susceptible to weather and climate variability. It is estimated that between 50-70% of the country's livestock production occurs in arid and semi-arid areas and is, therefore, equally susceptible to weather and climate risks (D'Alessandro et al., 2015). In 2013, on the basis of susceptibility of livelihoods to weather and climate risks, the World Bank highlighted poverty and vulnerability to climate change, as the most critical development challenges for Kenya (D'Alessandro et al., 2015; Government of Kenya, 2013).

As highlighted, the focus of this research is on public extensionists who are recognised as key to the realisation of the Kenyan Government's development visions for agriculture and the country. The final focus of the research differed from where it was positioned at the start. Initially, the aim was to explore in depth the day-to-day-work of extensionists in their efforts to work with, and for, smallholder farmers in implementing and realising the Kenyan Government's climate change policies for agriculture and addressing farmers' climate change needs. Two levels of Government had been tasked to cooperate in the mainstreaming of the climate change agenda in all development programs and plans, and the extension agents were key to their realisation. Challenges influencing the implementation of the Government's vision did exist, all of which had implications for how extensionists work in this space. These challenges included confusion, competition and poor information flow resulting from multiple government and non-government organisations working in climate change and the duplication of technologies. In some scenarios, farmers have been found to temporarily adopt adaptation technologies, and as soon as a new actor/organisation arrives, they drop them in favour of 'new' ones (Government of Kenya, 2018; Opiyo et al., 2016). The technologies, extensionists were tasked to transfer to farmers, were criticised for being developed by researchers without farmers in mind resulting in poor levels of uptake by farmers in Kenya (Government of Kenya, 2017b; Mwongera et al., 2017). Likewise, the failure to include those responsible for implementing policies with farmers (extensionists) created challenges that contributed to poor outcomes, as the extensionists lack technical know-how of the technologies (Ampaire et al., 2017; Shikuku, 2019). Further challenges included lack of financial resources, low technical capacity and small numbers of extensionists in rural Kenya (Mutunga, Ndungu, & Muendo, 2017; Opiyo et al., 2016).

By studying extensionists, the aim was to practically inform the enhancement of the policy and the extension work related to climate change while contributing to theory in operationalizing the mainstreaming of climate-change work in agriculture.

Initial field work revealed that extensionists' climate-change work was not a stand-alone set of duties or activities; it was embedded in all extension programs and in their day-to-day activities. Two extensionists who were interviewed explain:

> *There is no way you can separate climate change from our day-to-day extension activities, because climate change is real. It's biting and it is taking us to extremes* (David-Ward Agricultural Officer).

> *Climate change is not a stand-alone thing and therefore we integrate it in every aspect of agriculture be it production, marketing. We [extensionists] talk about it everywhere* (Jacob-Ward Agricultural Officer).

The focus of the research shifted away from solely climate change to explore the totality of what extensionists do, how they do their work and why. However, it did not lose sight of the broader challenges which shapes their work including climate change, poverty and food insecurity, resource limitations and multiple organisations seeking development outcomes through technologies transferred to and with farmers.

1.2 Research aims and research questions

This thesis explores at the individual (micro) level the day-to-day and lived experiences of public extensionists working with smallholder farmers in Makueni County in Kenya to improve on how to effectively address the needs of farmers including food security, climate change and poverty.

This research was directed by the following research questions:

(1) What do public extension agents do?

(2) How do they do what they do?

(3) What shapes how public extension agents do what they do?

1.3 Positioning the researcher

I am an agricultural extensionist by profession. I hold a bachelor's degree in Agricultural Education and Extension and a master's degree in Rural Systems

Management. I began my professional journey as a high school teacher teaching biology and agriculture in 2005. Two years later, I joined an NGO working as a Crops Improvement officer where I worked with the local community to improve production of climate change resilient crops such as sweet potatoes and cassava. My work with this NGO opened me up to the world of agricultural extension. My interest to work with the farmers grew and that is what drove me to work with the Ministry of Agriculture, Livestock and Fisheries in 2008. For those ten years I mostly worked with smallholder farmers at remote rural areas in Kenya serving in different capacities. I started my career as a Divisional Agricultural and Extension Officer, then later worked as a District Land and Environment Officer, a Training officer at a Farmer Training Centre and finally served as a Sub-County Crops Development Officer. Prior to starting my PhD studies, I worked as a Tutorial Fellow at Jaramogi Oginga Odinga University of Science and Technology where I taught courses in extension, rural development, and rural livelihoods.

I grew up in a small village within the semi-arid areas in the eastern part of Kenya with my grandparents who grew coffee, macadamia, maize and kept a big herd of cattle. Farmers in my village joked that “rains always come with a short-term permit. They will always be over before they start”. I grew up experiencing droughts and, sometimes, bountiful harvests which villagers equated to miracles. Occasionally, my grandparents would attend farmers’ (adult) school to learn about coffee management and I would see the Ministry of Agriculture pick-up truck distributing farm inputs (wheelbarrows, hoes, seeds) to farmers and vaccinating animals in the village. Forty years down the line, my family stopped growing coffee, the macadamia trees dried up, and the cattle herd reduced to a single cow which my mum cared for like a pet.

My interest in agricultural extension developed after seeing how smallholder farmers struggled to keep up with farming challenges such as low productivity, high crop losses due to prolonged droughts, and the never-ending problem of household food insecurity. During the period I worked as an extensionist, I was involved in various projects working to support farmers to adapt to climate change. However, from my day-to-day experiences, I questioned whether, as an extensionist, I was doing enough to address farmers’ vulnerability to climate change. A lot of empirical scholarly work mentioned how extension services were crucial to supporting farmers with climate-change related challenges. However, I realised most of these studies were based on farmers’ opinions and experiences. I therefore started this PhD journey in 2018, driven by a desire to explore from the lived experiences of extensionists, what shapes how they worked to

support smallholder farmers to overcome the challenges they face including climate change.

1.4 Thesis structure

This thesis is organised into seven chapters. This chapter provides an introduction to the thesis and is followed by the literature chapter which explores the concepts and empirical work in extension which is drawn on to inform this study. The literature specifically focuses on exploring the advisory, technology transfer and project delivery role of extensionists from both developed and developing countries. Extensionists' relationships with farmers and with other extension actors is explored. The chapter also draws on concepts used to differentiate and define the work extensionists do with farmers and their work with other extension actors. In chapter three, the broader Kenyan and Makueni County context of this research is described. The case description chapter provides relevant background and context details within which extensionists work. The chapter covers the history of extension services in Kenya, and current extension policies, organisation of county extension services, and the role of ward extensionists. The chapter also covers the national development policy which drives agriculture as a sector, including the extension service. The last section in this chapter describes in depth the administrative, agro-ecological, social, economic and political status of Makueni County. The section briefly summarises the agricultural projects in the county and the key non-governmental organisations mentioned by extensionists as collaborating in delivering services to farmers in Makueni county. The research design is outlined in Chapter 4. Chapter five reports the findings of this research study which emerged from the 26 interviews with public extensionists and eight interviews with informants from organisations identified as collaborating in delivering extension services to farmers in Makueni county. Chapter 6 includes the discussion of the key findings of this research. In Chapter 7, the final chapter, the research conclusion and future research and policy implications from this study are presented.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

The questions that this research sought to answer is what do public extensionists do, how do they do what they do and why, and what shapes how they do what they do. As mentioned, in Chapter 1, the aim of this study is to contribute to the agricultural extension practice and policy by empirically and exploring holistically what public extensionists in Kenya do and how they do what they do, and why. This research focuses on the lived experiences of individual public extensionists working under the County Government of Makueni and the experiences of actors within the broader extension system in the County. As outlined in Chapter 1, this research was set in the context of a developing country, predominantly public extensionists, servicing poor small-holder farmers, practicing subsistence farming and grappling with poverty, climate change, low farm production and productivity. Extension actors include non-governmental organisations, donor agencies, development partners, farmer organisations, public and private research organisations, and private service providers such as agro-input sellers. The first section explores broadly how extensionists navigate through the role of technology transfer and development program delivery with much emphasis on developing countries. The other sections draw from the theoretical and empirical perspectives and scholarly works in developed and developing countries. The section covers how extensionists navigate their relationship with farmers and other extension actors within the agricultural systems, to do their work.

2.2 What do extensionists do

The broad literature originally considered agricultural extension as a service to extend research-generated knowledge and technologies to the rural areas to improve the livelihoods of farmers (Rogers, 1995; Anderson, 2008). Accordingly, public agricultural extension, in particular, remains a policy tool which most governments in Africa use to respond to farmers' needs (Aker, 2011). A study conducted in African countries highlighted the role of agricultural extension in the continent's development, to increase agricultural productivity through provision of information, knowledge, and promotion of relevant technologies to farmers (Chowa, Garforth, & Cardey, 2013; Msuya et al., 2017). However, multiple studies continue showing that extensionists' roles go beyond technology transfer and famer training. Particularly in recent years, empirical studies have shown that extensionists support farmers in decision-making, link farmers to

markets, and engage with a broad range of service providers to address both existing and emerging challenges faced by farmers (Compagnone & Simon, 2018; Kuehne & LLewellyn, 2017; Makate & Makate, 2018; Maulu, Hasimuna, Mutale, Mphande, & Siankwilimba, 2021; Munthali et al., 2021). Improved information and knowledge was linked to enhanced farmers' practical skills, improved utilization of farm technologies and an overall improvement in productivity and incomes in Africa (Makate & Makate, 2018). Advisory activities by extensionists significantly contributed to behavior and attitude change and helped farmers make strategic farming and management decisions such as investing in crop insurance and climate change in mid-western states in the USA and in Malawi (Haigh et al., 2015; Mullins, Graff Zivin, Cattaneo, Paolantonio, & Cavatassi, 2018).

Much scholarly work on agricultural extensions services in developing countries is farmer-centered, that is, technology adoption (Bunclark et al., 2018; Mottaleb, 2018; Ngoma, 2018) and the traditional roles of extensionists such as farmer training, practice demonstration (Buehren, Goldstein, Molina, & Vaillant, 2017; Chimoita, Onyango, Kimenju, & Gweyi-Onyango, 2017; Mwololo, Nzuma, Ritho, & Aseta, 2019). Neglected, in particular, are the specific and context practices of extensionists and their experiences. The bulk of literature on how extensionists work based on a developed country context were extension services are largely privatized and where farmers engage in commercial farming (Compagnone & Simon, 2018; Dockès, Chauvat, Correa, Turlot, & Nettle, 2018; Klerkx & Peter, 2012; Labarthe & Laurent, 2013; Phillipson, Proctor, Emery, & Lowe, 2016). In the recent past, a few scholars have attempted to explore how extensionists work in developing countries where the majority focus on a single role; technology transfer (Brown, Nuberg, & Llewellyn, 2018a; Makate & Makate, 2018) knowledge and information-sharing (Munthali et al., 2021) and agricultural development programs (Friederichsen, Minh, Neef, & Hoffmann, 2013).This study, therefore, diverges from the traditional farmer-centered research which examines what farmers do and their challenges, and holistically explores the extensionists; what they do, how and why they do what they do.

The following section explores extension as a situated practice as depicted by theoretical and empirical studies. The concept of situated practice is a conceptual tool that posits an activity like extension is always socially situated (Long, 2001). In this sense, framing extension as a situated practice enabled the researcher to explore in depth what extensionists do and how the context shapes how they do what they do, which remains limitedly explored.

2.3 **Extension work as situated practice**

The perspective of being situated is drawn from the fields of cognitive science, anthropology and sociology, and postulates a belief that an activity like extension is mediated by the context in which individuals like extensionists are situated (Ovens & Tinning, 2009; Paton & Dorst, 2011). Situated practice acknowledges that actors engage in meaningful practices, play multiple roles and frame their understanding of situations based on their prior knowledge and experiences. Situational framing[1] was regarded by Paton and Dorst (2011) as ways in which actors like extensionists simplify and create alternative views of a problematic situation and how they afford a range of responses that yield a preferred outcome. This study acknowledges the significance of relationships between extensionist agents and the context within which they work and how it mediates how and why they do what they do. In recent years, scholars have shown how extensionists manage the 'ideal' policy directives and their own 'real' situational experiences (Landini, 2015). Studies have shown that actors, like extensionists, can reframe a preliminary understanding of a situation to create an actionable view that aligns with clients' demands as well as their own demands (Ovens & Tinning, 2009; Paton & Dorst, 2011). For instance, Argentinian extensionists depicted flexibility and creativity in responding to farmers' needs and understanding their world view (the reason they do what they do) (Landini, 2016). Friederichsen et al. (2013) argue that the institutional environment[2] within which public extension operates constituted a room within which grassroot extensionists manoeuvre to accomplish their job roles. The following section explores the literature on advisory roles of extensionists, and the relationship between extensionists and farmers and with professional actors in extension systems. The last section borrows from the theories of situated practice and explores how extensionists deliver on agricultural technologies and development projects. Arguments are based on the contextual environment within which extensionists deliver on their job roles.

Furnari (2019) defines situational frames as schemas that people can perceive others' agency in a social situation and use that to interpret their behaviour (p. 200).

[2] Institutional environment refers to state rules and policy on extensions, extension systems, extension approaches, and practices i.e. demand-driven, supply-driven, formal and informal network of actors, etc.

2.4 Extensionists – actors in an extension system

The production and exchange of information and knowledge is part of a wider extension system that includes, but is not limited to, extension agents and farmers (Klerkx, van Mierlo, and Leeuwis (2012). Extension services are part of a wider and complex agricultural development system which comprises diverse actors, regulations and public policies, trade and natural resource management (Birner et al., 2009; Spielman, Ekboir, & Davis, 2009). In the context of developing countries where agriculture is the mainstay, extension systems are comprised of actors such as the government, public extension and research organisations, farmers and farmer groups, NGOs, private service providers, input traders. (Eidt, Pant, & Hickey, 2020). These actors are diverse, and their interactions are underpinned by institutions embedded at micro, macro, and meso-levels.

Agricultural Knowledge and Information Systems (AKIS) and Agricultural Innovation Systems (AIS) are analytical frameworks used to explore the whole network of public and private actors and the complexity of how they create, share, exchange and utilise knowledge, information, and innovations (Klerkx et al., 2012; Labarthe, Caggiano, Laurent, Faure, & Cerf, 2013). Both concepts view extension services as a system consisting of multiple actors and governed by institutions that guide innovations, knowledge, and information exchange. Viewing extension through the lens of innovation systems allows one to explore the combination of interactions and the interdependence of pluralistic actors in accomplishing divergent and, sometimes, conflicting goals, interests, and perspectives.

2.5 Advisory role of extensionists

Extension and advisory services are based on knowledge and information exchange and different scholarly literature uses terms such as brokers, intermediaries, networkers, and gatekeepers to reflect what designated individuals/organisations in an innovation system do (Howells, 2006; Klerkx & Proctor, 2013; Klerkx et al., 2012). Theoretically, intermediaries and brokers mediate between the interests of actors and enable the flow of information within an innovation system. Empirically, the processes of intermediation and brokerage and the role of intermediaries and brokers in an innovation system has been explored (Kilelu, Klerkx, Leeuwis, & Hall, 2011; Klerkx & Peter, 2012). Klerkx and Peter (2012) describes AIS intermediaries as third-party actors who play a neutral role in bringing together multiple actors and facilitate their interaction. In this regard, the intermediary role is institutionalised and, thus, designated to an individual or an organisation whose role is to facilitate learning and cooperation

between actors involved in an innovation process and support the alignment of each actor's needs with possible solutions. Other studies depicted intermediary roles as ascribed to bodies such as research organisations, universities' funding agencies which operate between policy (macro) and operational (micro) levels (Howells, 2006; Kilelu, Klerkx, & Leeuwis, 2013; Parker & Crona, 2012; Schut et al., 2019). For instance, a study to explore the role of intermediaries in the East Africa Dairy Development innovation platform in Kenya that showed consortium actors operating at different levels mobilised resources, connected different actors and facilitated the articulation of the platform vision (Kilelu et al., 2013). The study showed that intermediaries acted as facilitators and advocated on policy changes, identified and linked actors within networks and coordinated their interactions. Intermediaries enabled negotiations between actors, mobilized and disseminated knowledge and technologies from diverse sources and articulated the needs and demands of actors (Kilelu et al., 2013; Kilelu et al., 2011). Other studies in Vietnam identified innovation brokers as matchmakers linking organisations with potential collaborative opportunities existing outside their regular networks (Friederichsen et al., 2013). Matchmakers stepped in where actors are not connected, either due to the unavailability of information, or due to trust constraints (Spiro, Acton, & Butts, 2013). Intermediaries have been identified as playing roles in technology transfer from researcher to users of technologies including farmers (Brown, Nuberg, et al., 2018a).

Studies to explore the functions of intermediaries in innovation, involving research companies and organisations in the United Kingdom, showed that innovation intermediaries (who were organisations) helped package technologies and acted as a go-between between the suppliers and the users of the technologies. Intermediaries helped formalise informal collaborations between firms by overseeing negotiations and facilitating the transfer of technologies across peoples, industries and organisations (Howells, 2006). The study, however, noted that intermediaries played much more varied, wider and holistic roles than was generally acknowledged. In this case, organisations providing intermediary roles did not restrict themselves to the ascribed roles but supported in areas such as contract research and capacity-building that did not require brokerage (Howells, 2006). Most descriptions of roles of brokers and intermediaries is broad, tending to focus organisational intermediation at the macro level. The studies also explored single function (e.g. commercial dairy sector project; (Kilelu et al., 2013) and explored intermediation and brokerage at a macro level between actors bound by a time-bound goal such as a project.

Public extensionists[3] are the subject of this study, and past empirical studies have indicated that they perform intermediary roles in multiple ways. Agricultural extensionists facilitated the flow of information in support of innovations within rural areas in Vietnam between government project teams, private actors and farmers (Friederichsen et al., 2013). A study in Japan showed that a government agent acted as an innovation intermediary facilitated networking of local actors with diverse expertise to enhance the development of niche market and technologies (Kishioka, Hashimoto, Nishi, Saito, & Kohsaka, 2017) Accordingly, private extensionists translated, simplified, and adapted information received from scientists for farmers into an applicable form for use in agricultural production and management decision-making (Haigh et al., 2015; Phillipson et al., 2016). Extensionists interwove their expertise with scientific knowledge and farmers' own way of doing things to craft advice that suited farmers' context and practice (Cerf, Guillot, & Olry, 2011; Labarthe et al., 2013). For instance, agronomists working as extensionists, gathered knowledge and information on finance, marketing, weather, and climate agencies from diverse sources and packaged it for delivery to farmers (Haigh et al., 2015). These findings amplify the working practices of extensionists and versatility of their 'way of doing' as intermediaries and brokers. The majority of these studies explore situations that are commercial and market-driven, for example, dairy value chains (Kilelu et al., 2013). This doctoral study shifts the emphasis to exploring grassroots extensionists working in an environment characterised by state-driven development, non-commercial small-holder farmers dominated by activities of donor projects and non-governmental organisations. This has not been sufficiently explored before. Extensionist-farmer relationships is termed essential for the success of their work at the grassroots level (Friederichsen et al., 2013).

2.6 **Extensionist-farmer relationships**

The advisor-farmer relationship was found central to what, why and how extensionists do their work in various empirical studies. A study on knowledge-exchange between farmers and agronomists showed that agronomists brokered connections with input sellers and gathered and delivered information to farmers (Kuehne & LLewellyn, 2017). However, in the context of implementing public demand, extensionists relied on

[3] Public extension agents are employed under the state Department of Agriculture, Livestock and Fisheries

personal relationships established over a long period with farmers to get things done. Dockès et al. (2018) for instance, showed that extensionists valued their relationships with farmers and used their knowledge and skills to ensure farmers derived satisfaction from their farming profession. In this study, the extensionists advised farmers on how to optimise both farm outputs and revenue while meeting social obligations such as food safety and environmental protection. Extensionists helped farmers to manage complex and, sometimes, conflicting individual economic and public goals that demanded collective action. The study reviewed advice and advisory roles in Australia and in Europe where extension is fully privatised and farmers engage in commercial farming (Dockès et al., 2018; Nettle et al., 2018). In a developing country like Vietnam, public extensionists exhibited flexibility while enforcing government directives to remain trusted and liked by farmers. The extensionists viewed themselves as members of farmers' families and took personal responsibility in addressing farmers' problems such as poverty and farm productivity (Friederichsen et al., 2013). Past studies showed that farmer-extensionist trust is not given. Extensionists negotiated trust and acceptance by farmers (Cerf et al., 2011; Friederichsen et al., 2013). For instance, private extensionists oscillated between acting as facilitators of learning and acting as experts who support farmers in making decisions and who reassured the appropriateness of uncertain issues such as investing in new farm technology (Cerf et al., 2011). On the other hand, public extensionists took the blame from farmers for the lack of market opportunities for their enterprises, even when the initiatives where project-driven (Friederichsen et al., 2013). In both cases, extensionists negotiated their way of supporting and dealing with farmers in order to preserve their relationship which included taking the blame or switching between roles.

Extensionists wore 'different hats' when dealing with different farmer issues. When handling problems such as the use of farm machinery, extensionists acted as a 'hands-on expert' by demonstrating the actual work to farmers (Dockès et al., 2018, p. 6). However, when supporting a farmer on farm management issues, the extensionist assumed the role of a coach by prescribing and giving technical recommendations to the farmer to implement (Dockès et al., 2018). Extensionists customized their 'way of doing' to fit farmers' 'way of doing' thus showing how advisor-farmer relationships shaped how extensionists accomplished their roles. However, these studies singly focused on how extensionists support farmers to organise farm work and did not explore the roles of extensionists beyond this, something that this research does.

Collaboration between extensionists with a wide range of expertise, was cited as a way of dealing with farmers' complex and multi-faceted demands (Dockès et al., 2018) .

Traditionally, extensionists were positioned between farmers, and research and development (R&D) providers, and their role was to push what R&D supplied to end-users who were mostly farmers. However, empirical studies continue to show that the extension agents network within the larger societal and professional network to access resources such as expertise and legitimacy (Kuehne & LLewellyn, 2017; Proctor, Phillipson, Lowe, & Donaldson, 2011).

2.7 How extensionists navigate professional networks

Recent studies have described how extensionists fallback to their professional networks across various organisations when navigating technical challenges which demand collective action (Phillipson et al., 2016). Phillipson et al. (2016, p. 324) used the term "singing off the same hymn sheet" to depict how actors in a network exchanged ideas amongst each other to gain a similar understanding about an issue. A study to explore cooperation and competition among private advisory agents established that extensionists working for different organisations drew on each other's knowledge, information and practical skills to address a problem that was of common interest (Compagnone & Simon, 2018). The study also showed that extensionists forged relationships with organisations with competitive interests. The term 'coopetition' was used by Compagnone and Simon (2018) to describe a situation where actors with competing interests forged cooperation around a similar business interest. Extensionists' relationships were built around professional, economic and social interests (Compagnone & Simon, 2018). While the study did not explore indepth how extensionists accessed the resources embedded in these relationships, the author mentioned the actors' sense of obligation to issues of common interest and reciprocity as shaping this natural cooperation. In particular, the author noted that actors in a collaborative relationship 'hold elements of power needed by one another' (Compagnone & Simon, 2018, p. 12) and, therefore, were 'forced' to work with each other.

According to Phillipson et al. (2016) bonding relationships between extensionists went beyond information exchange and included endorsing each other's expertise and building of interactional expertise. Trust, mutual support and reciprocity sustained the professional relationships forged within the extensionists' networks and generated a sense of mutual responsibility between themselves and to their farmer clients. For instance, extensionists reciprocated each other's goodwill by sharing technical and business knowledge, and information that enhanced each other's business opportunities. Extensionists introduced or recommended each other to potential clients

and, whenever one was unable to meet a farmer's needs, they tapped into the network for support (Phillipson et al., 2016). However, these studies were carried out in developed countries where private extension systems are predominant and extensionists often consult on a single specialist subject. This arena differs from the scenario in developing countries like Kenya where public extension services are predominant and extensionists perform multiple and diverse roles across a broad range of subject areas.

The context within which this research was undertaken meant that it was relevant to ground the research within the literature of how extensionists do their work. Extension is regarded as service activity (Labarthe & Laurent, 2013). The interactions and engagements of extensionists, farmers and other innovation actors occurred in within what Labarthe and Laurent (2013) calls front-office and back-office activities. Certain scholars explore different ways extensionists work with farmers by differentiating what and how they do front-office and back-office work. This area of research is explored in the following section.

2.8 Extensionists back and front office activities

Front-office activities entail one-on-one interactions primarily between extensionists and farmers, or between extensionists and others seeking advice, while back-office activities occur away from farmers and allow the extensionist to understand the context of the problem and gather knowledge and information relevant to building solutions (Labarthe et al., 2013) Extension agents were found to use what has been termed back-office activities to obtain relevant information through professional ties within and outside their organisations (Compagnone & Simon, 2018). Back-office activities are argued to provide opportunities for extension agents to understand the context of the their extension work and utilise their professional ties to discern farmers' challenges and gather solutions to the challenges (Compagnone & Simon, 2018; Labarthe & Laurent, 2013). A study on cooperation between advisory service providers in a developed country showed that in the back-office, field extensionists gathered new knowledge resources from experts within their professional networks who conducted research trials and developed agricultural inputs. The extensionists utilised weekly and bimonthly meetings organised by technical teams and professional groups such as "crop protection group" to up-date their knowledge repositories (Compagnone & Simon, 2018, p. 16) which they then shared with farmers. Labarthe and Laurent (2013) description of back-office actors differed from that of developing countries where actors

include government entities, community-based organisations, NGOs, donor organisation, agro-input sellers and research organisations.

So-called front-office activities were argued to enable extension agents to engage with farmers to co-construct problems and solutions. As argued by Labarthe and Laurent (2013), the solutions offered to farmers are not simple information, but outcomes of craft by extension agents who adjust and tailor the information to the farmer's context. Extension agents were reported to have a service-relationship with farmers whereby they purposively sought to discuss the farmer's problem and deliberately produce solutions consistent with the farmer's context and demands. Extension agents were identified as using one-on-one meetings, field tours and farm visits as part of front-office activities to meet farmers' skills and knowledge needs (Compagnone & Simon, 2018). The study by Compagnone and Simon (2018) concurs with Kuehne and LLewellyn (2017) findings that extension agents continually negotiate for sources of technical information for farmers. The description of how extensionists go about their front-office activities failed to acknowledge that sometimes farmers are unable to articulate their problems, thus, requiring the extensionist to use other strategies to ascertain farmers' issues. As mentioned earlier, these descriptions fail to account for developing country scenarios such as farmers' demands that are not within the job role of extensionists such as arbitrating conflicts.

Past studies underscore how extensionists grapple with context-based day-to-day extension duties and how they navigate through demands placed on them by farmers, the government, and development programs. This study aligns with the view that extensionists try to achieve the best possible outcomes in a given situation. Landini (2015) argues that many empirical studies still report the ideal extension practices as depicted by abstract theories and fail to capture the 'real' of extensionists which is based on their day-to-day context-based experience. Landini (2015) argues that exploring extension as a situated practice amplifies extensionists' agency in navigating their

day-to-day diverse extension demands. This study seeks to further such an understanding. Furthering knowledge and information dissemination to farmers' technology dissemination and project activities remains a significant role of extensionists.

2.9 **Technology transfer to farmers and the role of extensionists**

Agricultural development is long-anchored in technology development by scientists and its dissemination by intermediary agencies such as the agricultural extension services.

Technology adoption in agriculture has long underpinned most agricultural growth policies and programmes, that is, Green Revolution in developing countries (Chimoita et al., 2017; Goulet, 2013; Moseley, 2017). Common agricultural technologies include new crop varieties, management regimes such as planting procedures, spacing, soil and water management, pest, and disease control (Lambrecht, Vanlauwe, Merckx, & Maertens, 2014). Studies have shown that technology adoption can significantly impact on poverty reduction, productivity enhancement, climate change adaptation, and environmental protection in developing countries (Cook, Satizábal, & Curnow, 2021; Howells, 2006; Loevinsohn, Sumberg, Diagne, & Whitfield, 2013). Other studies in Africa have linked the utilisation of agricultural technologies such as seed, fertilisers and farming techniques to improvement in agricultural productivity, incomes, livelihoods and wellbeing (Aker, 2011; Msuya et al., 2017). In comparison to developed countries, studies have shown that the utilisation of improved agricultural technologies is still relatively low in developing countries, even after the Green Revolution (Msuya et al., 2017).

Multiple empirical and theoretical studies have explored smallholder farmers' related factors to explain levels of adoption of agricultural technology in developing countries (Glover, Sumberg, & Andersson, 2016; Mottaleb, 2018). The perceived failure in level of technology adoption is linked to barriers and/or constraints of farmers. The constraints and barriers identified by recent studies in Africa include the lack of information access, low income, production risks such as droughts and lack of farm inputs. Household social-and economic status such as level of education of the head of the house, household income and gender, were listed as determinants of technology adoption (Brown, Llewellyn, & Nuberg, 2018; Chimoita et al., 2017; Defang, Manu, & Amungwa, 2017; Dube, 2017; Kathage, Kassie, Shiferaw, & Qaim, 2016; Kerr et al., 2018; Meijer, Catacutan, Ajayi, Sileshi, & Nieuwenhuis, 2015). The low technology uptake by farmers was partially blamed for stagnating crop and livestock productivity, particularly in Africa (Aker, 2011). Other studies have blamed farmers for being uncooperative, ignorant, and slow, hence responsible for the low levels of uptake and/or dismal technology performance (Wanvoeke, Venot, Zwarteveen, & Fraiture, 2016). Most of these studies suggest that the improvement in technology adoption rests with extensionists through enhancing farmer training and capacity-building. Without any form of support, for instance, inputs and credits, farmers in most developing countries were found unable to put recommendations into practice. While farmers' challenges could reflect broader social-economic issues such as poverty, they

were found to impact public extension agents' efforts to support farmers to implement agricultural programs (Parkinson, 2009).

The pillar of agricultural programs and projects in developing countries has been to convince farmers of the benefits of technologies through approaches such as field demonstrations, field days, farmer field schools, farmer-to-farmers learning (Cook et al., 2021; Makate & Makate, 2018), and further support farmers to implement technologies (Loevinsohn et al., 2013; Mottaleb, 2018). While the role of extension services in sub-Saharan Africa is widely acknowledged, a large body of literature suggests that the deciding point for technology adoption sits with farmers.

Broadly, extensionists engage in a range of activities to disseminate technologies and support farmers to adopt these in developing countries. Extension agents mobilised and informed farmers about technologies, and utilise on farm-trials, field demonstrations, farmer trainings, and field days to expose and enhance farmers' learning (Lambrecht et al., 2014). Most of these methods are reported to be geared towards encouraging voluntary change in farmers (Vrain & Lovett, 2016) and to convince them to try out new technologies (Lambrecht et al., 2014).

In the recent past, scholars have explored from a deeper and context-based point of view of why the adoption of farm technology by farmers in Africa remains low despite government and donor investment and the perceived value of the technology (Glover et al., 2016; Glover, Venot, & Maat, 2017; Wanvoeke et al., 2016). Glover et al. (2017) point out the failure of research studies and development agencies to acknowledge the realities of smallholder farmers and how their diverse social and institutional environments potentially mediate their ability and decisions to take up farm technologies. For instance, a study in Burkina Faso showed that poor smallholder farmers engaged with a development project promoting drip irrigation kits to gain access to other benefits such as free inputs and credit facilities. On the other hand, large commercial and well-to-do farmers were found to engage with the project to forge new alliances to acquire social prestige (Wanvoeke et al., 2016). The study argues that farmers' logic, their context (social and economic status) informed their interests to take up technologies promoted by development projects (Wanvoeke et al., 2016). These studies highlight that farm technologies cannot be separated from context and from the interactional practices between farmers and actors (i.e. extensionists) who bring technology into practice. Landini (2016) considers good extension practice as a function of how extensionists manage the interface between what farmers know and do, their reason for doing and the suitability of the recommendations to the farmer's context.

Recently, studies have shown extensionists deviated from the recommended practices to accommodate farmers' contextual situation, that is, experiences and beliefs. A study to evaluate extensionists' understanding of Conservation Agriculture (CA) in Africa showed that, at inception, extensionists used their expertise to technically explore the suitability and applicability of technologies to their farmers' context. Extensionists were said to have viewed the CA technology as a combination of older and new agronomic practices and this informed their advice to farmers. The study reports that extensionists provided farmers with a basket of options which included disintegrating the CA practices and implementing each step by step to fit the farmers' context and spare them the difficulties of making changes to their way of farming (Brown, Nuberg, et al., 2018a). Landini (2016) refers to such extensionists' interactive approach as 'negotiation of technology' and the present study seeks to further that understanding.

Access to resources, labour availability, market access, culture of resource dependency, conflicting information sources, political patronage, conflicts between levels of government and lack of policy directions significantly impact how public agricultural extensionists deliver on their roles in Africa (Brown, Llewellyn, et al., 2018; Brown, Nuberg, et al., 2018a; Davis, Babu, Rasanga, & Ulimwengu, 2020; Mwololo et al., 2019; Ragasa, Ulimwengu, Randriamamonjy, & Badibanga, 2016). However, how extensionists manage and navigate these contextual aspects to do their job has received little attention in the literature. This study seeks to further that understanding.

Agricultural development programs are common instruments used by government and NGOs to enact agricultural policies for achieving the desired outcomes in agricultural production, that is, increase productivity for food security (Turner et al., 2017). Traditionally, agricultural programs employ research-generated technologies and practices and provide extension services to enhance and support their uptake by farmers. However, programs are noted to operate in a complex environment which influences their activities and the overall impact to the targeted group (i.e. farmers) (Kilelu, Klerkx, & Leeuwis, 2014). Some of the complexities include evolving demands of farmers (Kilelu et al., 2011) and conflicting program directives with farmer aspirations (Friederichsen et al., 2013). These studies acknowledge the increasing complexity of the situations and the context within which extensionists accomplish their role, including program delivery and meeting farmers' day-to-day needs. This study aligns with scholars such as Landini (2016) who views extensionists as dynamic, strategic, and creative in the way they deal with complexities of real context of extension practice. The following section explores from the extensionists' lived experiences how they navigate project demands and the policy situations to deliver on their role.

2.10 **Extensionists program delivery role**

While past studies acknowledge the existence of tensions between the 'why' of extension program and that of other actors including farmers (Landini, 2016), the subject remains under-researched. Studies carried out in Vietnam (Friederichsen et al., 2013; Minh, Friederichsen, Neef, & Hoffmann, 2014) and Uganda (Parkinson, 2009) showed that projects bestowed certain roles to local extensionists. The studies showed a difference in how extensionists handled program directives that were not adjustable and those program situations that granted them some level of discretion and autonomy on action and decision-making.

A study to explore how dominant extension program practices shaped extensionists' work in Vietnam showed a program's rationale shaped what extensionist did. In this case, the programs prescribed the use of demonstration models by Commune Extension Workers (CEWs) to transfer technologies to farmers. On a day-to-day basis, CEWs selected participating farmers and farmer groups, selected demonstration sites, gathered demonstration material, established technology demonstrations sites, and monitored their performance (Friederichsen et al., 2013). These responsibilities granted CEWs some degree of control over the resources channelled to pay for the establishment and running of the demonstration models. Extensionists tapped into demonstration resources and other development subsidies to compensate for funding shortages and perform other extension activities (Friederichsen et al., 2013). In the National Agricultural Advisory Services' (NAADS) program in Uganda, field extensionists used technology demonstration materials and their power to nominate farmers for a field trip as a way of motivating farmers to continue participating in the program (Parkinson, 2009). At the management level, the program partly used the budget set for extension services to supply in-kind grants and input subsidies to farmers. Extensionists were pressured by political leaders to show tangible success of the program and to entice farmers' to participate as demanded by the program (Parkinson, 2009).

Both studies also explored how extensionists navigated program directives which conflicted with their professional understanding and their way of doing things. In Uganda, extensionists struggled with the inherent shortcomings of the NAAD's demand-driven program approach which conflicted with the local farmers' understanding of the government extension service as free. Farmers viewed themselves as program beneficiaries, but not as clients as presumed in the program's model, thus creating a discrepancy between what extension agents needed of farmers and what farmers believed. Farmers were reluctant to pay for extension services, few

attended capacity building workshops, and some neglected demonstrations set up by advisory agencies contracted under the NAADS program (Parkinson, 2009). Similarly, in Vietnam the program was guided by a supply-driven approach which differed with the demand-driven, participatory, and market-driven extension approach which guided extension activities (Friederichsen et al., 2013; Minh et al., 2014). Extensionists responded differently to these two case scenarios. Where extensionists could not alter project directives, they used a stock of repertoires within their disposal to address challenges brought by conflicting programs' prescriptions and to motivate themselves and farmers (Parkinson, 2009). In Vietnam, extensionists were in charge of planning and managing demonstration models, and that role gave them some level of control over purchase of demonstration materials and farmers' activities such as trainings. Extensionists used their position to negotiate for commissions on purchasing inputs and took a share of the harvest from the demonstration fields to compensate for funding shortages (Friederichsen et al., 2013). Extensionists used incentives such as nominating farmers who frequently attended training workshops for field trips, or rewarding them with technology demonstration kits to boost attendance (Parkinson, 2009).

Extensionists grappled with program directives which were considered as undermining their professional standing and farmers' interests. Friederichsen et al. (2013) report that extensionists perceived the effort to promote rubber and pig production by a development program, as undermining farmers' choice of livelihood through afforestation and rabbit-keeping. Even though Community Extension Workers felt aggrieved by the program 'way of doing things', the author notes that extensionists remained silent and were hesitant to share their challenges with their managers for fear of being ignored (Friederichsen et al., 2013, p. 566). Similarly, ingrained hierarchical structures in the extension system and agricultural programs were said to make it hard for field extensionists to voice concerns to the project team and superiors in the Ministry of Agriculture, research organisations and project teams (Eidt et al., 2020). Extensionists chose to 'buy time' by allowing farmers more time to understand and accept the program choice of enterprise (Friederichsen et al., 2013, p. 563).

Mahon, Farrell, and McDonagh (2010) note that when extensionists face institutional dilemmas and the tensions are not addressed, this ultimately affected how they implemented extension programs. In the case of the Irish 'Options for Farm Families Programme', extensionists expressed a lack of communication between them and their senior managers and the extra work the program put on them and farmers. In order to safeguard their relationship with farmers, extensionists circumvented the program

directives and continued using traditional approaches (Mahon et al., 2010). Similar findings were reported in a study promoting Orange Fleshed Sweet Potatoes in Tanzania. Extension agents deferred the program directives to form new farmer groups and recruited existing groups which they deemed easier to work with (Glover et al., 2017). These studies show how non-negotiable program directives shaped how extensionists performed their job role and how extensionists used their position powers to either subvert or deliver on the programs' objectives. Mahon et al. (2010) posits that extensionists at the grassroots[4] level occupied a position of significant power within the organisational hierarchy which empowered them to operate in a way that essentially determined a program's implementation. The study acknowledged the power that the extensionists have at the field level and how they draw from such to make decisions to safeguard their relationship with farmers and to accomplish their roles. Accordingly, empirical studies showed situations where grassroots extensionists had discretion and autonomy to side-step policy directives at their level. For instance, a commune extension worker was reported to disregard a policy directive which required extensionists to give priority to poor farmers in favour of farmers she/he felt were enthusiastic, cooperative, and readily to implement her/his advice (Friederichsen et al., 2013). The study depicts extensionists' everyday reality of navigating through tensions between government policies and farmers' demands and how they deliver on project accountabilities.

It is widely acknowledged that extension in developing countries is operating in a context of limited resources, and this emerged as significant in this thesis. The next section explores institutional challenges faced by public extension services and some of the policy directives that have informed changes in funding and organisation of extension services.

2.11 **Extension resources**

The delivery and financing of extension services in developing countries has evolved in the last century with the role of the state considerably changing. In developing countries, for example, the recommendations by the World Bank and International Monetary Fund (IMF), instituted Structural Adjustment Programs (SAPs) which led to a

[4] This refers to extensionists who are at the bottom of the organisational hierarchy and who interact with farmers on a day-to-day basis. They can also be regarded as field extensionists.

massive reduction in funding of public advisory services (Benson & Jafry, 2013). These adjustments saw many developing countries reduce funding for public services as governments were advised to explore other economically viable ways of delivering and financing extension services (Benson & Jafry, 2013). Reduced financial support led to the freezing of employment of extension officers as well as a reduction in the role of state governments in the provision of extension services in various countries including Kenya (Faure, Desjeux, & Gasselin, 2012; Lauzon, 2013; William Rivera, 2011). In Kenya, past studies show that SAPs led to a significant drop in the budgetary allocations towards agricultural extension services and, furthermore, a decrease in the extension staff numbers (Muyanga & Jayne, 2006). Despite such impacts,, many developing state governments were advised to explore other ways of financing extension services including the possibility of farmers paying for extension services (Akullo, Maat, & Wals, 2018).

In response to the pressure to make extension services efficient and effective in responding to farmers' needs, various reforms in funding and delivery of advisory services emerged. For instance, the involvement of stakeholders in the delivery of extension services was highly emphasized as a means of addressing diverse farmers' needs, as well as a way of filling the gap left by the shrinking public service (Davis & Place, 2003). Others emphasized the need to create a system that would enhance the participation of farmers in the provision of extension services (Christoplos, 2012; William Rivera, Qamar, & Crowder, 2002). Extension pluralism opened doors for multiple actors to provide a range of advisory services to farmers individually, or through collaboration with other agencies, however, public extension services still remain crucial for smallholder farmers in rural areas (Davis et al., 2020). In some countries, public extension services remain a preferred option and, sometimes, the only option for farmers in remote areas. However, studies carried out in the last two decades reflect how public extension services in developing countries continue to grapple with declining public funding, increasing farming challenges, under-staffing and the over-reliance on donor funding to run their extension services (Benson & Jafry, 2013; Davis et al., 2020; Mwololo et al., 2019). Even though these changes and challenges have significant impacts in terms of the way public extension services are resourced and practiced, there exists limited research attention on understanding how the frontline extension staff navigate through this situation.

2.12 **Conclusion**

This chapter provides an overview of the theoretical and scholarly literature which is drawn to inform this research and eventually answer the research question which is, what do extensionists do and how do they do what they do and why.

This chapter provided an overview of the theoretical and scholarly literature which is drawn on to inform this research. Scholarly work has shown what extensionists do goes beyond traditional roles, such as technology transfer, to include supporting farmers in decision making, linking farmers to markets, and addressing existing and emerging needs. Extension has emerged as a system with interconnected actors exchanging knowledge, information, and innovation. These networks are maintained by an array of relationships that enable extension actors to create, exchange, and utilise knowledge and information. However, divergent, and sometimes conflicting interests emerge in these relationships. Extensionists work to ensure they safeguard the interests of the multiple actors the engage with. The literature has shown that extensionists wear different hats at different times while working with other extension actors and farmers. Extensionists switch roles to act as advisers, coaches, mentors while at times are acting as farmers' friend and family. Extensionists act as information brokers and intermediaries and matchmake farmers' needs with possible solutions. Extensionists relationships are underpinned by social capital which includes cooperation, collaboration and trust which is accumulated over long period of interaction. Literature has shown how extensionists deliver development project goals which include balancing and meeting the sometimes-conflicting day-to-day needs of farmers and the goals of government and donor agencies. The concept of front-office and back-office is used to make sense of how extensionists engage with farmers and the behind the scenes work with other extension actors.

While these studies acknowledge the complexity of the context within which extensionists work a significant part of this scholarly work is carried out in developed countries where farming is commercial, and market driven. The studies also tend to focus on one single role e.g., pesticide management, and revolve around extensionists working as consultants.

However, this study shifts the focus to developing countries where extension is primarily government and donor funded and where extensionists serve poor, smallholder, subsistence farmers. In Africa, the work of public extensionists is highly under researched and therefore this study seeks to examine in-depth their day-to-day experiences and holistically explore how they deliver on their diverse roles.

The following chapter describes, in depth, the background information about the case study which will enable the researcher and the reader to contextualize the research findings.

CHAPTER 3 : CASE DESCRIPTION

3.1 : Background to the extension services in Kenya

What public extensionists do now is a characteristic of the long history of extension services in Kenya and the numerous transitions experienced in the last 50 years. Exploring part of that history is critical to understanding why extensionists do what they do. The following section briefly explores public extension services before and after independence in 1963, key extension approaches and their drivers. The section further explores the delivery and financing of extension in Kenya to understand how extension is resourced.

The history of extension services in Kenya is traced back to the pre-colonial period where Christian missionaries conducted farming demonstrations alongside preaching the gospel (Jones, Garforth, Swanson, Bentz, & Sofranko, 1997; Mukembo & Edwards, 2015). After colonization, the British Government set up agricultural extension to encourage rural communities to learn and adopt new practices and technologies to improve the production of cash crops such as coffee and tea for export back to Europe. As in other European countries, extension services were offered by the Ministry of Agriculture in collaboration with local agricultural colleges and research organisations (Mukembo & Edwards, 2015; Muyanga & Jayne, 2006). During the colonial period, there existed two separate extension systems: one for the white large-scale farmers and another for the Indigenous Africans. The white farmers received extension services from government extension agents who trained in local colleges and their services were enhanced with subsidised inputs and credit facilities for farming. The extension systems designed for the Indigenous Africans were highly centralised, top-down, and often characterised by coercion where farmers were penalised for the failure to adopt or to adhere to the prescribed agricultural practices (Davis, 2008; Maulu et al., 2021; Msuya et al., 2017; Muyanga & Jayne, 2006).

After independence in 1963, the provision of agricultural extension services remained the responsibility of the National Government under the Ministry of Agriculture. However, the country assumed two extension systems, that is, one system that focused on food production termed as a whole farm approach run primarily by the Ministry of Agriculture. The other was the commodity-based extension model which customized advisory services to farmers growing cash crops such as coffee, tea, pyrethrum, and sugarcane to increase production and achieve high quality products. This form of extension service is provided today by the private sector including

government parastatals and corporations such as the Kenya Tea Development Authority which provides extension services only to tea growers (Mukembo & Edwards, 2015; Nambiro, Omiti, & Mugunieri, 2006). Extension services targeting small-holder farmers gained precedence between 1965 and 1980 where, through donor support, the Government launched the 'Farming Systems Research and Extension (FSR/E). The approach promoted a linkage between farmers, extensionists and researchers and involved conducting on-farm trials and demonstrations for new crop varieties and technologies (Nambiro et al., 2006). The role of extensionists was to transfer technologies and practices recommended by scientists to farmers and relay feedback to the research agencies.

In the 1990s the Training and Visit approach (T&V) approach funded by the World Bank become the prevalent extension approach targeting smallholder farmers (Mukembo & Edwards, 2015). The T&V model objective was to enhance the delivery of the extension service and to boost the uptake of farm technologies by farmers to increase farm productivity. Public extensionists walked with a 'cookbook' like manual that dictated what activities, when to visit, and what extension messages to deliver to farmers (Davis, 2008; Jayne, Mather, & Mghenyi, 2010; Mukembo & Edwards, 2015; Muyanga & Jayne, 2006; Nambiro et al., 2006). Extensionists were, therefore, conduits through which researchers transferred technologies to farmers. The extensionists' role was to enhance the adoption of new production technologies by farmers. At the same time, they would collect farmers' concerns and report them back to the researchers and subject matter specialists to address them (Benson & Jafry, 2013; Chimoita et al., 2017).

The T&V approach registered mixed results for both farmers and extensionists as reported by scholars. Critics of T&V observed that the program was top-down and, therefore, was mainly pushing technologies to farmers without considering their opinions (William Rivera & Sulaiman, 2009). Farmers also complained that the program pressured them and that they were unable to implement all the recommendations given by the local extension agents (William Rivera, 2011; Sulaiman & Hall, 2002; Swanson, 2008). Extensionists interviewed in this study, and who implemented the T&V approach, applauded the program for equipping them with technical knowledge and improved extension resources such as motorbikes and demonstration kits and supplied input subsidies to farmers. One shared her experience:

I can say during the T&V program at least there were resources. We were provided with materials for training and demonstrations. There were meetings frequently. We would go and interact as staff and share ideas and at least we were backstopped so that we may be able to work efficiently and effectively…. We were able to reach a given number of farmers who were our targets. But that approach experienced some challenges because after some time farmers started running away from us. Because every time we were coming to them [Fortnightly]…and even before they implemented [what we taught them], we came back again and therefore they became impatient with us. They could hide or sometimes run away from us. (Alice-Ward Agribusiness Officer)

Scholars attributed the challenges highlighted by the extensionists to the supply nature of the T&V approach which rendered extensionists as conduits and farmers passive actors and beneficiaries of government and donor programs (Mukembo & Edwards, 2015). Scholars and development agents recommended a participatory extension system approach to give farmers an opportunity to voice their farming needs and concerns (William Rivera, 2011; Sulaiman & Hall, 2002). Since the 1990s, public extension services in Kenya assumed more horizontal, participatory and farmer-driven approaches such as Farmer Field Schools (FFS). The Government ceased to be the sole extension service provider and opened doors for a pluralistic extension system. This facilitated the entry of private agencies, NGOs, farmer organisations and parastatals to deliver services to farmers (Government of Kenya, 2017a; Mukembo & Edwards, 2015; Muyanga & Jayne, 2006). During the same period, farmers assumed a greater responsibility towards demanding extension services and extensionists were required to be more accountable and responsive to farmers' needs (Jock Anderson & Feder, 2004; Benson & Jafry, 2013; Bitzer, Wennink, & Piters, 2016; Cabral, 2011; Nambiro et al., 2006).

3.2 **The delivery and financing of extension service in Kenya**

The delivery and financing of public extension services in Kenya assumes four different forms of arrangement; public delivery and public finance, public delivery and private finance, private delivery and private finance, and private delivery and public finance (Nambiro et al., 2006, p. 2). Public delivery and public finance comprise the traditional government agricultural extension service which remains dominant in Kenya. Private finance and public delivery arrangements are where government extension staff are

contracted by non-public organisations, such as NGOs, to deliver extension services to communities. In Kenya, this is common in arid and semi-arid areas where most NGOs are found, and scholars term this arrangement as of mutual benefit to both the public extensionists and the contracting NGOs as it delivers a broader range of service than what each organisation would achieve individually. Private delivery and private finance, also termed as commodity-based extension services, are where commercial organisations provide extension services to farmers to improve production for market. This mode of delivery is common in commercial crop out-grower schemes and highly commercialized high-value agriculture such as tea, sugarcane and dairy. Extension services are fully privatised with farmers paying for the cost of extension through their producer cooperatives. Private delivery and public finance entails the outsourcing of responsibility for extension delivery to private sector providers such as NGOs and CBOs (Jon Anderson & Van Crowder, 2000; Muyanga & Jayne, 2006; Nambiro et al., 2006). Agricultural development programs contribute significantly to the funding extension services targeting small-scale subsistence farmers (Government of Kenya, 2012; Muyanga & Jayne, 2006; Nambiro et al., 2006)..

In a nutshell, extension services in Kenya have transitioned from principally being a government-dominated service to a pluralistic service where private and NGOs are involved in both delivery and financing of services. However, public extension service is predominantly responsible for providing service to millions of smallholder farmers in the rural, urban, and peri-urban areas in Kenya. In 2013, the public extension services went through a major transition because of governance changes in the country. The following section describes the broader governance changes in the Kenya and how that impacted in the governance and management of extension services. The changes have implications of how public extensionists work and interact with farmers and the local political leadership.

3.3 **Overview of devolved public extension services**

In Kenya, public extension services were devolved in 2013 to the county governments alongside other departments such as water, environment, health, and roads. The county governments were made responsible for the planning, budgeting, and execution of most agricultural services, including extension services under the Ministry of Agriculture, Livestock and Fisheries. The responsibilities devolved to the county governments include crop and animal husbandry, plant and animal disease control, extension services and fisheries. The national Government retained functions such as policy-making, flood and drought disaster preparedness, development of strategic

marketing infrastructure, staff capacity-building and technical assistance. The two levels of government work together through the implementation of various bilateral agriculture projects, policies and technical support to extension staff (Government of Kenya, 2017a, 2017b). The management and organisation of agricultural extension is still guided by the National Agricultural Sector Extension Policy (NASEP) developed in 2012 (Government of Kenya, 2012).

The main functions of the Ministry of Agriculture, Livestock and Fisheries, as stated in the National extension policy, is to promote extension services, support research development and technology dissemination and conduct surveillance and management and control of pest and diseases. Other roles include ensuring the conservation of natural resources and gathering and maintaining information about the agricultural sector (Government of Kenya, 2010, 2012, 2017a; Ministry of Agriculture Livestock and Fisheries, 2017). Senior managers at the Ministry, at both the national and county government level, are tasked with the responsibility of advocating and lobbying for funding, policies, laws and regulations and other issues which concern the agricultural sector and representing agricultural interests at regional, continental, and international levels (Government of Kenya, 2012).

3.4 Organisation of the County public extension services

As shown in **Figure 1**, the organisation structure of the County Ministry of Agriculture, Livestock and Fisheries Organisational is hierarchical, consisting of directorates of Agriculture, Livestock and Fisheries (Government of Kenya, 2017a). Within every directorate there are subject matter specialists[5] such as, crops, agribusiness, who provide technical support to other extension staff at the sub-county and ward levels.

[5] All staff in the Ministry identify as extension officers despite their job deployment and the level at which they serve

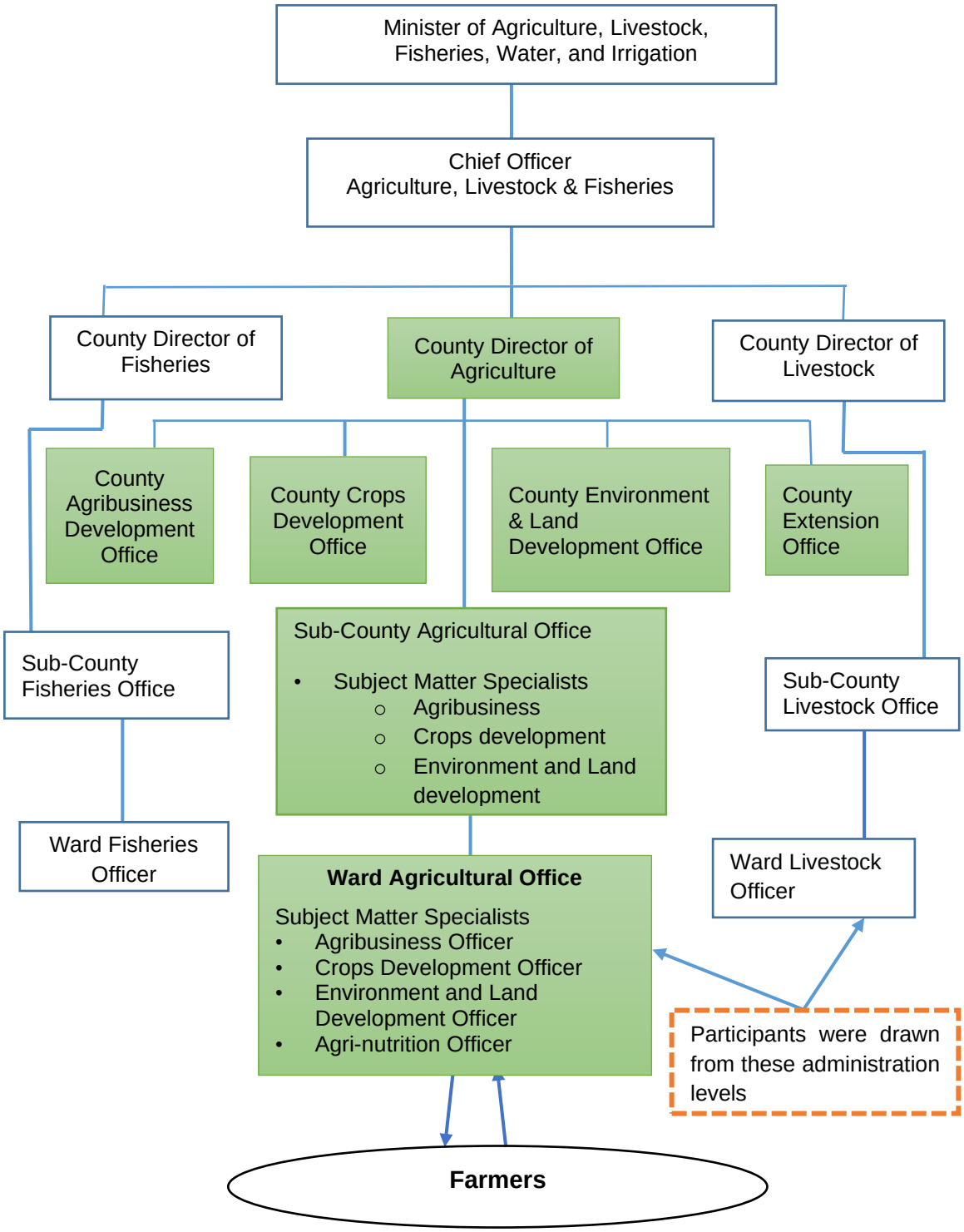

Figure 1: County Ministry of Agriculture, Livestock and Fisheries Organizational structure
Source; (Government of Kenya, 2017b)

3.4.1 **Annual performance contracting**

Performance contract is a management tool by both National and County governments to monitor and ensure the delivery of public services are efficient and effective and meet the needs and the expectations of the citizens (Government of Makueni County, 2019). It is also a tool used to monitor the performance of public servants. The performance contract is anchored in the country development priorities and the National Government priorities including the Presidential "Big Four" development initiatives. The Ministerial annual Performance Contract is signed between the County Governor and the county Executive Committee Member (also referred to as the Minister) in charge of the Department of Agriculture, Livestock, Livestock, Fisheries and Irrigation Development (Government of Makueni County, 2019). The ministerial targets are then shared by departments and cascaded down from the county to individual extensionists at all administrative levels (Government of Makueni County, 2016, 2018a, 2018b, 2019).

3.5 **Ward extension officers**

As shown in **Figure 1**, wards are the lowest political administration unit and extension agents are responsible for day-to-day delivery of extension services to farmers. A ward is headed by a Ward Agricultural Officer (WAO) who reports to the County Director of Agriculture through the sub-county agricultural officers. The same hierarchy applies to the directorate of Livestock and Fisheries. The expected extension staff establishment at the ward level include a Ward Agricultural Officer, Ward Agribusiness Development Officer, Wards Crops Development Officer, Ward Environment and Land Development Officer, Ward Agri-Nutrition Officer. Extensionists implement the KPIs outlined in the Ministry of Agriculture, Livestock, Fisheries and Irrigations Annual Performance Contract as shown in Appendix 4. The Performance Contracts' targets include the county's agricultural flagship projects and donor development projects which are anchored in the County Annual Development plans, the County Integrated Development Plan and the County's Vision 2030. The KPI outputs mostly in terms of numbers of farmers trained, number of farmers adopting technologies, number of technologies promoted, number of farmers linked to market and so forth are shown in Appendix 4. More details about the key projects extensionists implement as part of their KPI are discussed later in this chapter.

Table **1** describes indepth the roles of the subject matter specialist at the ward level. Government resources, including those from projects, are channelled through the Sub-County Agricultural Officers who share with the respective ward officer for the day-to-day delivery of extension services and the implementation of projects. Resources include funding, stationery, materials for demonstrations and fuel for motorbikes which are the main mode of transport at the ward level. (Government of Makueni County, 2019).

3.5.1 **Formal duties of Ward Extension Officers**

Broadly, the role[6] of public extension and advisory agents is to facilitate and support access to technical knowledge, information and technologies by farmers, farmer organisations and actors in the agricultural sector through trainings and demonstrating appropriate technologies and innovations (Government of Kenya, 2017a). It is the responsibility of the extensionist officer to facilitate interaction between farmers and partners in the sectors of research, agribusiness, education, and any other relevant organisations (Government of Kenya, 2017a). Day-to-day, extensionists are tasked with responding to farmers' demands, diagnosing their problems and recommending appropriate solutions. Extension agents are also tasked with the responsibilities of searching for new farming technologies and agribusiness opportunities and flagging the opportunities[7] to farmers. Extensionists are expected to collaborate with other service providers which support farmers' access to credit and inputs, markets, and other forms of support (Government of Kenya, 2012, 2017a).

Extensionists implement the KPIs outlined in the Ministry of Agriculture, Livestock, Fisheries and Irrigations Annual Performance Contract as shown in Appendix 4. The Performance Contracts' targets include the county's agricultural flagship projects and donor development projects which are anchored in the County Annual Development plans, the County Integrated Development Plan and the County's Vision 2030. The KPI outputs mostly in terms of numbers of farmers trained, number of farmers adopting technologies, number of technologies promoted, number of farmers linked to market

[6] These are roles prescribed in the Ministry's Guidelines and Standards for Agricultural Extension and Advisory Services policy document (Government of Kenya, 2017a).

[7] Flagging an opportunity is a term used to mean the promotion of potential agricultural enterprises by extensionists to farmers who make choices depending on their interests and resource capacity. Before extensionists flag opportunities together with farmers, they evaluate the farming potential and challenges in the area and identify farming options that address household food security needs, increase incomes and ensure environmental sustainability.

and so forth are shown in Appendix 4. More details about the key projects extensionists implement as part of their KPI are discussed later in this chapter.

Table 1: Formal duties and responsibilities of extension officers at the ward level

Deployment	Duties and responsibilities
Ward Agricultural Officer (WAO)	The officer is responsible for; • Overall administration and management of agricultural activities in the ward • Implementation of agricultural projects and programs in the ward • Organizing field days, demonstrations, and tours in collaboration with stakeholders and farmers • Overseeing the mainstreaming of gender, HIV and Youth in project activities in the ward • Participating in agricultural shows and exhibitions • Monitoring and reporting on food situations and agricultural emergencies such as pests and diseases, flooding, drought, and crop destruction by wildlife • Preparation of periodic reports for the wards • The extension officer may be deployed in specific project areas such as Crop Production, Land Development or Agribusiness • Supervises Agricultural officers deployed at the ward level.
Ward Livestock Extension Officer	The Officer will be in charge of coordinating Livestock activities at the ward and will provide extension services and information within the ward. At the ward level, the officer will coordinate any of the following programmes; • Animal Production and Range Management • Promote livestock agribusiness and livestock marketing • Farm structures for both poultry and dairy • Pasture establishment and conservation of feeds • Improvement of breeds through selection and subsidized AI services • Train the citizens on local feed formulation for all livestock • Enhance market linkages and value addition • Promote entrepreneurship in beekeeping and other emerging livestock • Disease surveillance, prevention, and treatment in liaison with the veterinary officer and livestock production • The officer will also be responsible for networking and collaboration with other stakeholders. • Mainstream cross-cutting issues such as gender co-ordination, HIV/AIDS, and the environmental concerns.
Ward Environment and Land and Development officer	• Co-ordination of activities related to environment and land use management; • Soil and water conservation; water harvesting mechanization extension; • Farm Structures, agro-processing; training and supervising project staff.
Ward Agribusiness Development Officer	• Promote value chain development for all commodities • Promote and monitor agribusiness development activities in the ward • Capacity-build farmers on all aspects of agribusiness and support business planning • Participate in field days, exhibitions, and agricultural shows
Ward Crops Development Officer	• Oversee the implementation of crop development activities in the ward • Capacity-build farmers on all areas on crop production and management • Monitoring and reporting on migratory pest and carry out disease surveillance

3.6 The technical and demographic status of ward extension officers in Makueni County

According to the policy document outlining the standards for agricultural extension and advisory services, the minimum education qualification for a public extension officer deployed at the ward level is a college certificate[8] course in either general agriculture, horticulture, agribusiness, agricultural education and extension, agricultural and home economics and food technology (Ministry of Agriculture Livestock and Fisheries, 2017). It was established in the present study that 90% of interviewed ward extension officers have a minimum of a diploma in one of the above-listed agricultural areas. The majority of the extensionists were holders of a college certificate in agriculture and, in the course of service, most of them enrolled for further studies and acquired either a diploma or a degree certificate. Over 65% of the extensionists interviewed in this study were 50 years of age, had worked for over 30 years and were due to retire by 2022. The youngest livestock extension officer was reported to be 48 years old while the youngest agricultural extension officer was 33 years old. Over 50% of the extensionists had at least worked outside Makueni County and all interviewed staff had served in two or more wards (formally divisions). Most of the wards were managed by only one extension staff member instead of five, as recommended in the National Extension policy (Government of Kenya, 2017a). Thirty percent of the ward extensionist officers were women and served at different capacities.

According to the Makueni County 2019/2020 Annual Development Plan, The Ministry of Agriculture, Livestock, and Fisheries was reported as one of the most understaffed ministries in the county. As shown in Table 2, between 2015 and 2019 extension staff numbers have been reducing mainly due to retirement and the inability of the Government to hire fresh staff.

[8] A college certificate is granted for taking a one-year course, while a diploma and degree certificate takes two years and four years consecutively. However, it takes three years to upgrade from a diploma to a degree certificate.

Table 2 :Makueni County extension staff establishment between 2015-2019

Sub-county	Number of Agricultural extension staff/Years				
	2015	2016	2017	2018	2019
Mbooni (6 Wards)	18	18	17	16	14
Kilome (4 wards)	12	12	10	9	8
Kaiti (4 wards)	12	11	14	12	9
Makueni (6 wards)	15	14	15	15	14
Kibwezi West (6 Wards)	15	15	12	11	10
Kibwezi East (4 wards)	12	11	8	7	8

(Government of Makueni County, 2019)

NB The data captures extension staff at both the sub-county and wards' agricultural offices

Field extension agents play a significant role in the implementation of agriculture projects funded under the national and county government. In order to understand how and what is shaping extensionists day-to-day work, one needs to acknowledge the key set of policies and institutions which shape extension services. In this section, the development blueprints are described for both the national and the county level and how they relate to what and how extensionists do their job. This facilitates a deeper understanding and appreciation of the broader landscape and how it shapes how extensionists do their job. The chapter also describes in depth development projects and actors taking part in delivery of extension services in Makueni county and how they shape field extension agents work.

3.6.1 Enabling environment for delivery of extension and advisory services

The national policy document on guidelines and standards for extension and advisory services acknowledges that the performance of extension services is dependent on the environment within which it is embedded. The policy document identifies social, economic, political, technological, and legal frameworks as influencing the ability of the Ministry to deliver on its extension and advisory services mandate (Government of Kenya, 2017a, p. 15). The policy also identifies enabling factors such as political commitment and goodwill and the recognition by different arms and levels of government of the value of extension services. Other enablers include financial resource availability, collaboration and networking between extension service

providers, and training and learning support for extension agents (Government of Kenya, 2017a). At the organisational level, the policy document noted that extension and advisory services require sound financing mechanisms to facilitate the day-to-day operations.

One of the highlights of the policy documents is that all agricultural extension services must align to the national and county government strategies, policies, legislations, and priorities (Government of Kenya, 2010, 2012). As demonstrated later, most of the agricultural programs implemented by extension agents at the county level are anchored to the country's key development blueprints. The national blueprint goals flow down to the county governments who integrate them into their development blueprints which guide priorities for resource allocation and project choices.

3.7 Agriculture as a predominant economic activity in Kenya

In Kenya, agriculture is the predominant source of livelihood for over 80% of Kenya's rural population (GoK, 2010). In 2019, the agriculture sector contributed 35% to Kenya's GDP, as shown in Figure 2.

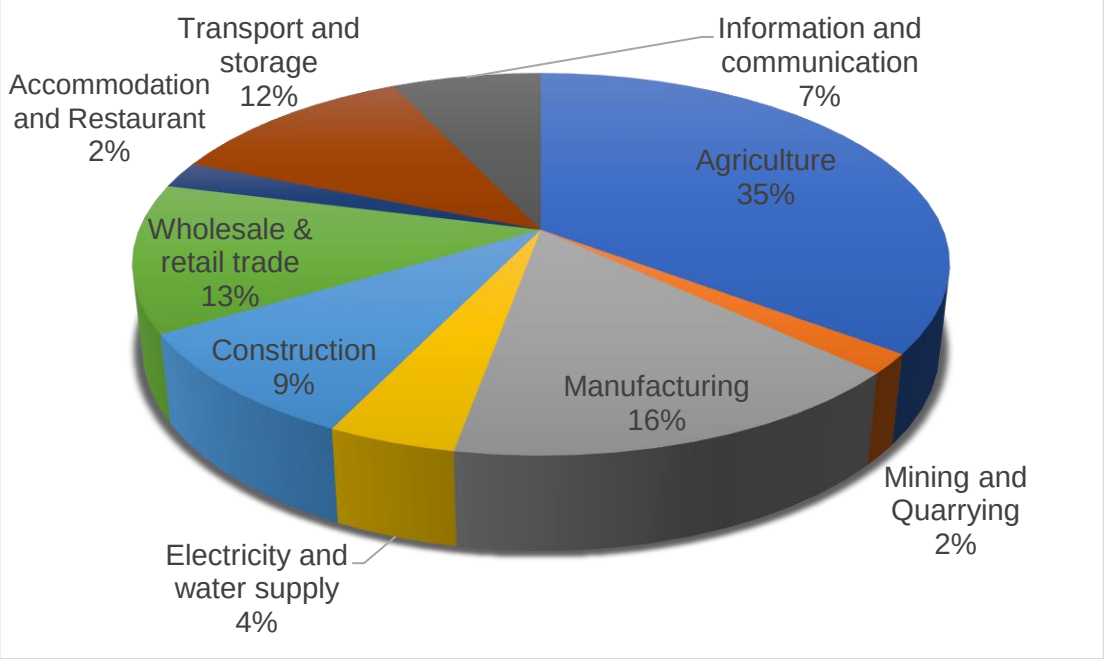

Figure 2: Gross Domestic Product by activity 2019

Source: (Kenya National Bureau of Statistics, 2019)

The agricultural produce is mainly horticultural crops, flowers, coffee, and tea and contributed over 65% to the country's export and earned the country 60% of total foreign export earnings as shown in **Figure 2**. Over 40% of the country's work force is

employed formally and informally by the agriculture sector, while the majority of the rural workforce is agriculturally based. The sector further indirectly supports other sectors through linkages to agro-based manufacturing industries, transport, retail, and wholesale traders (GoK, 2007, 2010).

One of the significant contributions of the sector is food and nutrition security for a population of 50 million (Kenya National Bureau of Statistics, 2018, 2019). Seventy-five percent of the country's total agricultural produce is from smallholder farmers who own less than two hectares of land. In 2019, smallholder farms contributed over 70% of the overall marketed agricultural produce, reflecting their continued dominance in the sector (Kenya National Bureau of Statistics, 2019, 2020).

3.7.1 Climate change and agricultural performance

Nevertheless, the performance of the agricultural sector has been unstable, mostly due to drought and erratic rainfall as shown in Figure 3**: Historical timeline of major agricultural production shock (1980-2012)**

(D'Alessandro et al., 2015; Kenya National Bureau of Statistics, 2019). For instance, it was reported that between 2018 and 2019 maize production, which is the staple crop, declined by over 10%, largely due to drought in several areas coupled with the fall army worm (*Spodoptera frugiperda*) infestation. Agricultural production is predominantly rain-fed, yet over 80% of the country is arid and semi-arid and records between 200-700mm of rainfall annually. As a result, agricultural production and smallholder livelihoods are highly susceptible to weather and climate variability (D'Alessandro et al., 2015). Based on the susceptibility of livelihoods to weather and climate risks, in 2013, the World Bank highlighted poverty and vulnerability to climate change, as the most critical development challenge for Kenya (D'Alessandro et al., 2015; Government of Kenya, 2013).

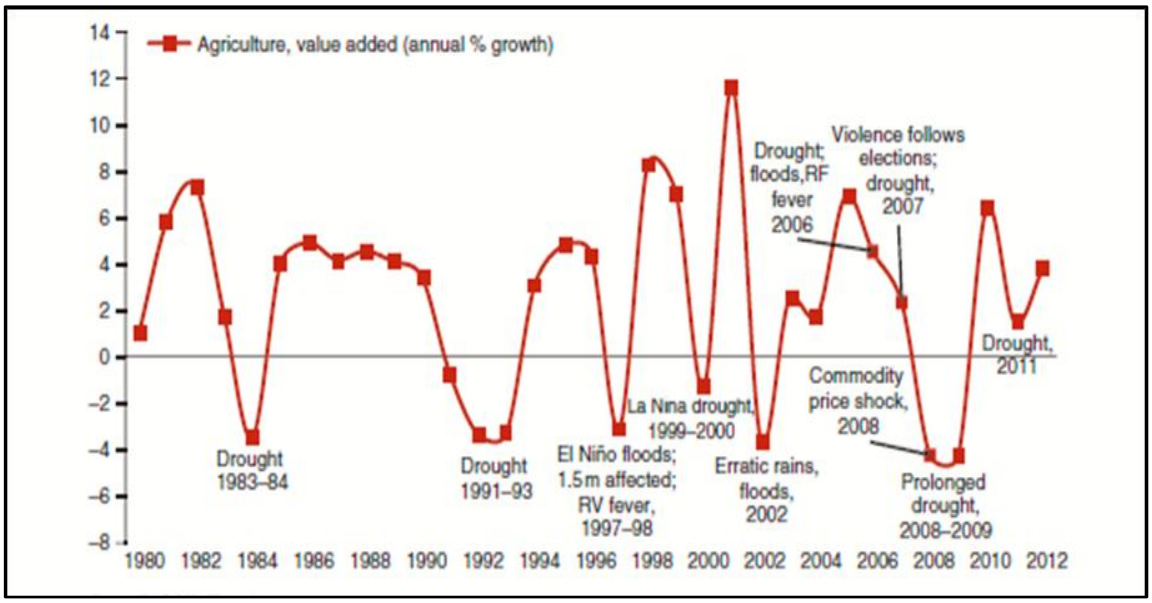

Figure 3: Historical timeline of major agricultural production shock (1980-2012)

Source: (GoK, 2017)

As shown in **Figure 4: Trends in agricultural and economic growth (2009–2019)**

Source: , the country's economic growth significantly improved or declined with the growth in the agricultural sectors. Therefore, the performance of the agriculture sectors remains significant to the overall economic growth of the country and livelihoods of smallholder farmers.

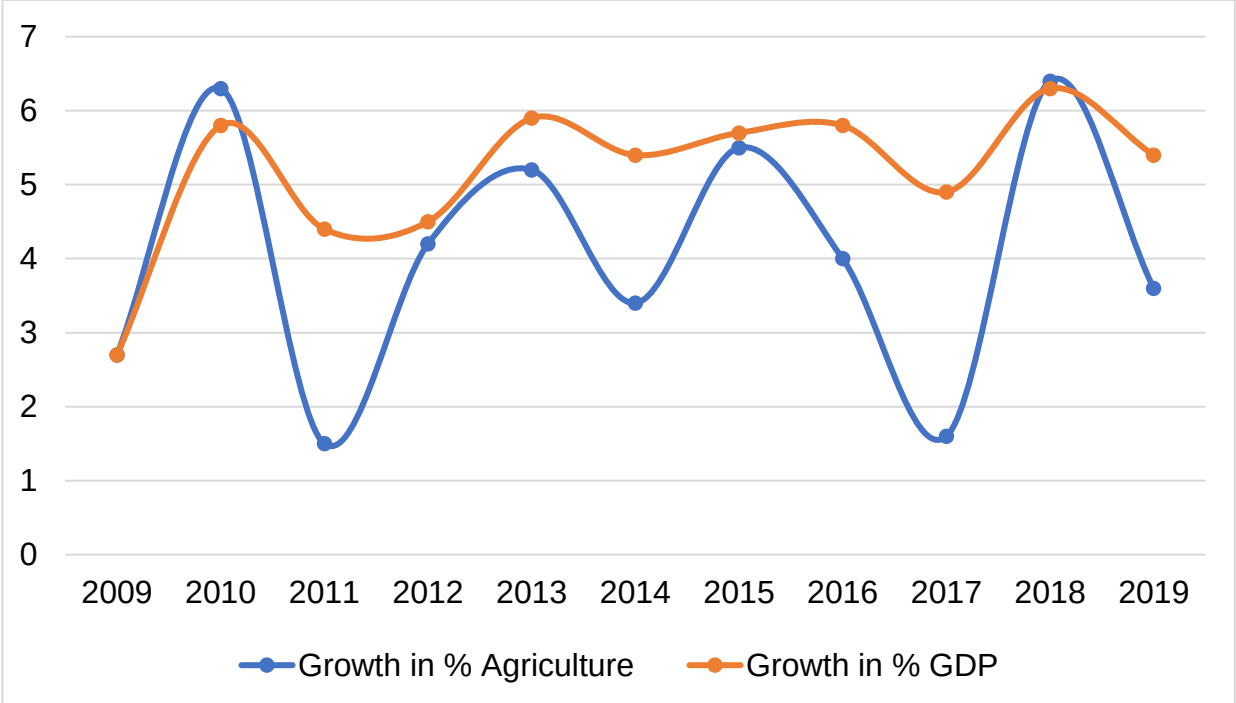

Figure 4: Trends in agricultural and economic growth (2009–2019)

Source: (Kenya National Bureau of Statistics, 2019)

Owing to the integral role of agriculture in development, the agriculture sector, including extension services, has been identified as a significant contributor to the country's short- and long-term economic growth. The following section describes the key National Government development blueprints which are currently shaping the agricultural sectors and, by extension, the delivery of extension services at Makueni County.

3.8 The Kenya Vision 2030 and the Presidential Big 4 Agenda

Kenya Vision 2030 is a long-term development blueprint which aims to transform the country into an industrialised, middle-income county providing a high quality of life to all the citizens by 2030 (GoK, 2007). The goals of the Kenya Vision 2030 are in line with Sustainable Development Goals (SDGs) 1 and 2 of ending poverty, hunger and achieving food security and nutrition (GoK, 2007). The blueprint is anchored on three pillars: social, economic, and political. The economic and social pillars aim at enhancing economic growth rate and creating a just, cohesive, equitable, clean, and secure country. The political pillar aims to promote a people-centred, result-oriented and accountable democratic system and safeguard the rights and freedom of every individual living in the country (GoK, 2007). The Kenya Vision 2030 identifies the agriculture sector alongside tourism and wholesale and retail trade as key to achieving the targeted 10% Gross Domestic Product (GDP) growth rate per annum. The targeted 10% GDP growth rate and the vision to create wealth and employment was highly correlated with growth and development of the agriculture sector, as depicted in **Figure 4: Trends in agricultural and economic growth (2009–2019)**

Source: **.**

In 2018, the President of Kenya launched The Big 4 Agenda comprising food security, affordable housing, manufacturing, and affordable health care for all Kenyans. The Big 4 Agenda was mainstreamed in the 2019-2022 Medium Term Plan, hence, guiding most of the Government's development activity within the period. The Agenda on Food and Nutrition Security seeks to reduce food and nutrition insecurity, reduce household budgets on food as a percentage of the income, increase farmers' daily income and enhance agricultural small and medium enterprises. Some of the agricultural initiatives that the National government planned to implement included increasing areas on irrigation, subsidizing farm inputs such as fertilisers for smallholder farmers, improved farm technologies and mechanisation and deploying an early warning system to cushion farmers from impacts of climate change.

The Vision 2030 and The Big 4 Agenda are implemented by both the national and county Governments through a five-year Medium-Term Plan (MTP) and County Integrated Development Plans (CIDP), respectively. To ensure policy and development coherence, both levels of government, in consultation, identify priority projects and programs which are implemented within the five-year cycle. The CIDPs reflect the priorities of the MTPs at the national level and, therefore, are designated to ensure the SDGs and Africa Agenda 2063 are mainstreamed at the county level, including any new or emerging issues.

3.8.1 **Key National Government agricultural projects and initiatives**

In line with the Vision 2030 and The Big 4 Agenda, the national Government has implemented several agricultural policy and project initiatives on the agenda for Food and Nutrition Security. These initiatives are implemented by the line Ministries at the County Governments. The national Government, in collaboration with county governments, implemented several food and security initiatives. The projects are the E-Voucher Financing system for smallholder farmers under the KCEP-CRAL[9] project, and fertiliser subsidies to farmers provided through the National Cereals and Produce Board. Through the county government, farmers are provided with clean and improved planting materials (seeds and cuttings) and enacted systems for farmers to hire farm tractors and machinery as a way of enhancing agricultural mechanisation. The national Government also launched the NARIG-P[10] project to boost agro-processing and value chain development (Government of Kenya, 2020). Makueni County is currently implementing all these projects (Government of Makueni County, 2018b, 2019). As earlier discussed, field extension agents are responsible for implementing most of these projects and how they do their job is linked to contributing to the realisation of not just farmers' needs, but the larger national development agendas. The following section describes Makueni County's administrative status, agro-ecological background, farming systems and livelihoods.

[9] Kenya Cereal Enhancement Project-Climate Resilient Agricultural Livelihood (KCEP-CRAL)

[10] National Agricultural and Rural Inclusive Growth Project (NARIG-P)

3.9 **Makueni County: Administration**

Makueni county is in the south-eastern part of Kenya and borders Machakos, Kitui, Taita Taveta and Kajiado counties. Makueni is situated between latitude 1º35´ and 3º00´ south and longitude 37º10´ and 38º30´ east, covering an area of 8,008.7 Km^2. The county has 153 Km^2 of gazetted forests which are Kilungu, Mbooni, Kibwezi, Nthangu, and Makuli (Government of Makueni County, 2018b).

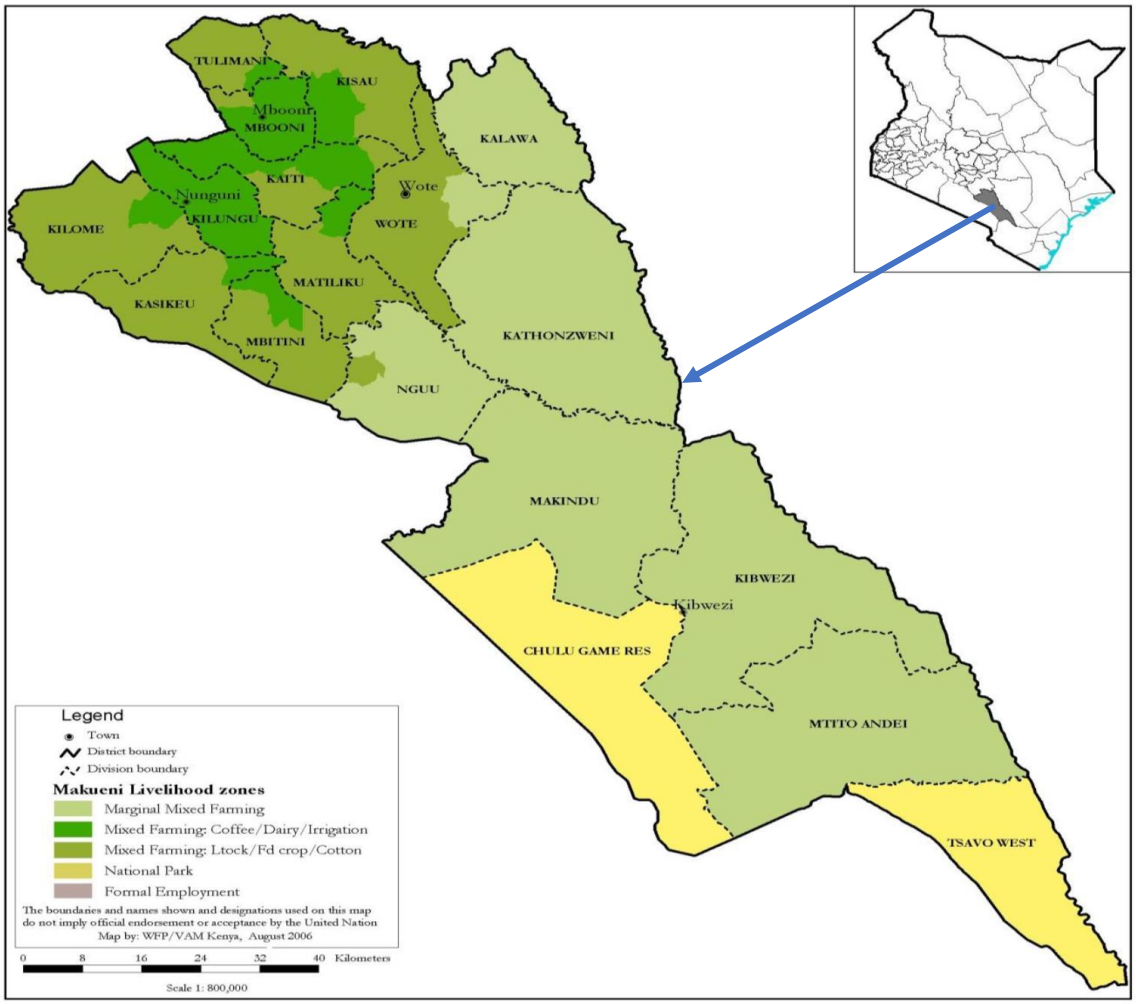

Figure 5: The Map of Makueni county showing livelihood zones

Source: (National Drought Management Authority, 2019)

As per the 2019 Kenya population and housing census, Makueni county has a population of 987,653 where 497,942 and 489,691 are female to male, respectively. Makueni county is subdivided into six sub-counties which are further subdivided into 30

wards. As depicted in Table 3 the most populated sub-counties are Makueni, Mbooni, and Kibwezi East with Kaiti and Kibwezi West being the least populated. The overall county poverty levels[11] are 34.8%, compared to the overall country's poverty levels of 36.1% as reported in the 2019 National Population and Household census (Kenya National Bureau of Statistics, 2020). Kibwezi East and Kibwezi West sub-counties reported the highest levels of poverty[12] levels at 42.3% and 42.6% respectively (Kenya National Bureau of Statistics, 2020). These two counties are situated within the arid and semi-arid parts of the county and it is within this region where most of the NGOs are based.

Table 3: Makueni County Population and Poverty Levels by Constituency

Constituency/ Sub- County	Number of Wards	Area (Km^2)	Population	Poverty levels by % of total Population
Mbooni	6	949.20	200,350	31.4%
Kilome	3	641.30	107,549	28.9%
Kaiti	4	422.90	60,952	29.3%
Makueni	7	1,546.10	336,856	31.3%
Kibwezi West	6	2100.70	84,946	42.6%
Kibwezi East	4	2216.50	197,000	42.3%
Overall Makueni county	30	7,876.7	987,653	34.8%

Source: (Kenya National Bureau of Statistics, 2020)

[11] Poverty rate is the percentage of the population living in households with income or consumption expenditure below the poverty line which is currently set at $1.90 a day (~Ksh. 250) by the United Nations (Kenya National Bureau of Statistics, 2020).

[12] A condition characterised by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information. It depends not only on income but also on access to services (Kenya National Bureau of Statistics, 2020)

3.9.1 **Ecological background**

Makueni County is mainly within the lower eastern region part of Kenya and largely arid and semi-arid. The highest point in the county are the Mbooni hills which lie in the northern part and rise at an altitude of 1900m above sea level. The northern part covers mainly the hilly masses of Mbooni and Kilungu wards which receive rainfall ranging from 800-1200mm per annum and the medium zone of Kaiti receiving up to 750mm. Kilungu, Kaiti, Mbooni and Kilome wards have potential for crop production, dairy, horticulture, and coffee production.

Figure 6: A photo of the hilly masses in Kaiti ward
Source: Authors photo

The southern part of the county is generally low-lying and rises at an attitude of 600m above sea level. The vegetation is largely low-lying grassland and receives rainfall ranging from 250-400mm. Owing to the low rainfall, the area is reported to have potential for livestock production, beekeeping and small irrigation for horticulture along the major permanent rivers (Government of Makueni County, 2018b). The temperature ranges in the county are between 24-33^{0}c and 18-24^{0}c during the warm season and cold season, respectively (Government of Makueni County, 2018b; National Drought Management Authority, 2019).

Figure 7: A photo showing the arid part of Masongaleni ward in Kibwezi East
Source; Authors photo

The county experiences bimodal rain patterns which are characterised by two rain seasons: the long rains between March and May and short rains occurring between October and December as shown in Figure 8.The short rainy season is regarded as more reliable and its contribution to overall crop and livestock production is higher than that of the long rainy season (Government of Makueni County, 2018b; National Drought Management Authority, 2019). Despite the distinct rain seasons, rainfall is reported as erratic, unreliable and variable in the date of their onset (National Drought Management Authority, 2019). For instance, in 2018 the county recorded a high rainfall in March and April. According to the research participants and the National Drought Management Authority, the 2018 short rains continued through January and February and overlapped with the onset of the 2019 long rainy seasons. This resulted in mudslides and landslides in the hilly areas and floods in the low-lying areas leading to loss of lives and livelihoods and the destruction of infrastructure across the county (National Drought Management Authority, 2019).

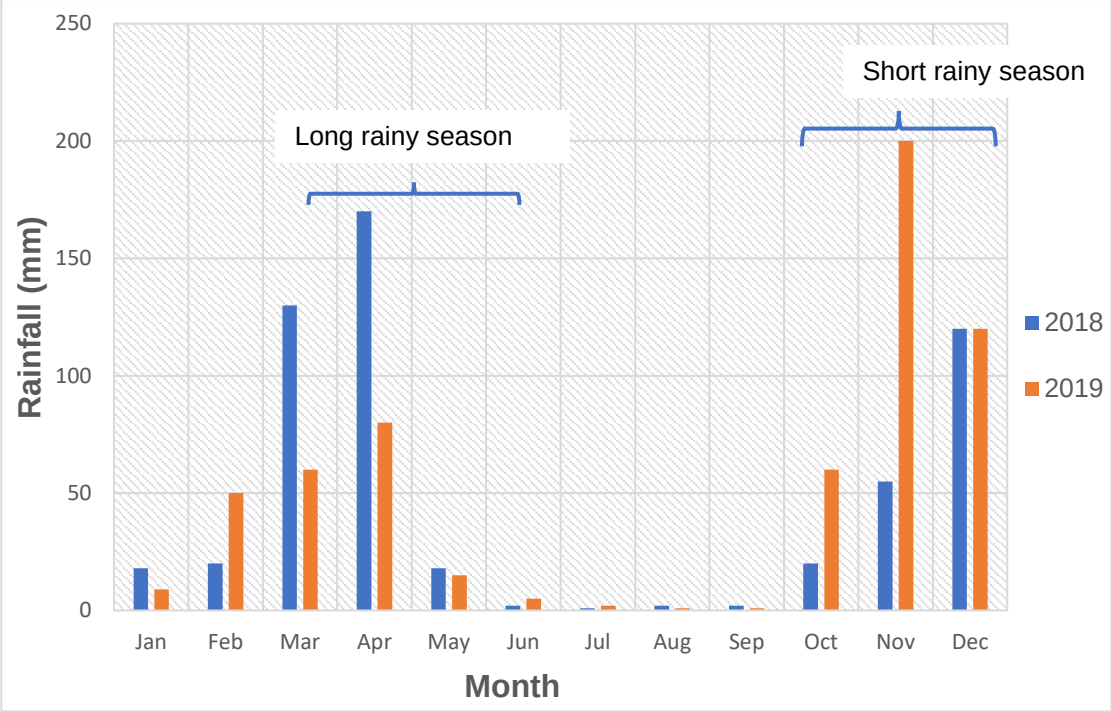

Figure 8: Average rainfall recorded per Month in Makueni County in 2018 and 2019

Source: National Drought Management Authority- Makueni County 2020

The same reports indicated there was a significant increase in crops and livestock production, however, in the same period, pest and disease incidences and post-harvest loss of legumes and cereals were reported as the excess rain interfered with harvesting (National Drought Management Authority, 2019). The prolonged short-rain season recorded in both years resulted in the delayed onset of the long rainy season and the significant reduction in total rainfalls received. According to the County Medium Term evaluation report, the erratic rainfall patterns in the county undermined the effort of the local community and the Government to achieve sustained food production. Furthermore, the occasional good seasons[13] are matched by extremely dry seasons which undermine the sustainability of food production and livelihood. The overall long-term impact of the erratic weather is a perennial food shortage which has made the county reliant on '*mwolyo*' (relief food) from the national Government and donor organisations (Government of Makueni County, 2016, 2018b). As later discussed, most of the county government agricultural development priorities address the perennial food insecurity and livelihood challenges.

[13] Periods when the rainfall received is sufficient leading to a bumper crop harvest

3.9.2 **Agro-ecological zones and farming systems and livelihoods**

Makueni County is classified into five agro-ecological zones; lower highlands (LH) zones that cover Kilungu and Tulimani and Kaiti hills with agricultural potential for crops such as avocadoes, maize and dairy. The upper midland (UM) covers Mbooni and some parts of Kilome sub-counties with agricultural potential for dairy, coffee, cereals, fruits, and vegetable production. The lower midlands (LM) represent over 70% of the total Makueni county's land surface and cover Makueni, Kibwezi East and West and some parts of Mbooni sub-county. These areas have agricultural potential for production of green grams, sorghum, millet, cotton, citrus, and beef production (Government of Makueni County, 2018b; Mutua, Oluchiri, & Gweyi, 2016).

Figure 9: A typical farm in agro-ecological zone Lower Medium 6

Source; Authors photo

As shown in

Table 4 most of the sub-counties have multiple ecological zones, therefore, have a wide range of agricultural activities. However, during the study it was noted that farmers grew crops, such as maize, even when the ecological zones were regarded as not favorable for the crop. Mutua et al. (2016) termed farmers' choice of agricultural

activities as complex as it was not just determined by the ecological condition, but also by cultural and socioeconomic factors.

Table 4: Agro-ecological zones by sub-county and crop enterprises

Sub-county	**Farming systems**	Ecological Zone	**Crop enterprise**
Makueni	Marginal mixed farming	LM4-5	Sorghum, green grams, cowpeas, pigeon peas, dolichos, mangoes, citrus, maize
Mbooni	Mixed farming food crop/livestock/cotton	LH2, UM3, UM4, LM3, LM4, LM5	Potato, coffee, sunflower, maize, cotton, millet, French beans, common beans, yellow passion fruit, cabbages, tomatoes, avocado, pigeon peas, cow peas, maize, beans, beekeeping
Kaiti	Mixed farming food crop/livestock/cotton	LH2-UM2, UM5-L6, UM3-L6	Avocado, mangoes, tomatoes, cabbages, French beans, common beans, yellow passion fruit, maize
Kilome	Mixed farming food crop/livestock/cotton	LH2-UM2	Maize, beans, sweet potato, kales, cabbages, avocado, apples, coffee, sorghum, cow peas, mangoes, cassava, pawpaw, green grams
Kibwezi West	Marginal mixed farming	LM4, LM5, LM6	Maize, beans, mangoes, pigeon peas, vegetables, green grams, cowpeas, beekeeping, goat keeping, beef production
Kibwezi East	Marginal mixed farming	LM4, LM5, LM6	Maize, beans, mangoes, tomatoes, bananas, sorghum, green grams, cow peas, pigeon peas, cassava, dolichos, beekeeping, goat keeping, beef production

Key; UM –Upper Medium LM –Lower Medium LH –Lower High L –Lower

Source; National Drought Management Authority (2019)

The county is also classified in terms of livelihood zones by the county development blueprints and the National Drought Management Authority monthly food and nutrition security assessment reports. This form of classification influences how county allocated agricultural projects extension activities. As shown in Figure 10, there are three main livelihood zones in the county namely; mixed farming (coffee, dairy, irrigation), mixed farming (food crops, livestock, cotton) and marginal mixed farming (Government of Makueni County, 2018b; National Drought Management Authority, 2019). The marginal mixed farming is the dominant livelihood representing 40%, while mixed farming of coffee and dairy and crop and livestock equally cover 30% of the total livelihoods.

Maize, green grams (green moong beans) and cowpeas are the major crops grown in the county and are highly relied upon for food security. In recent years, green grams have become an important source of income for households in mixed marginal zones s (Government of Makueni County, 2018b). Even though the productivity of maize has been on the decline due to erratic rains and prolonged droughts, it is still the preferred crop of choice by farmers in all ecological zones as reported by the research participants.

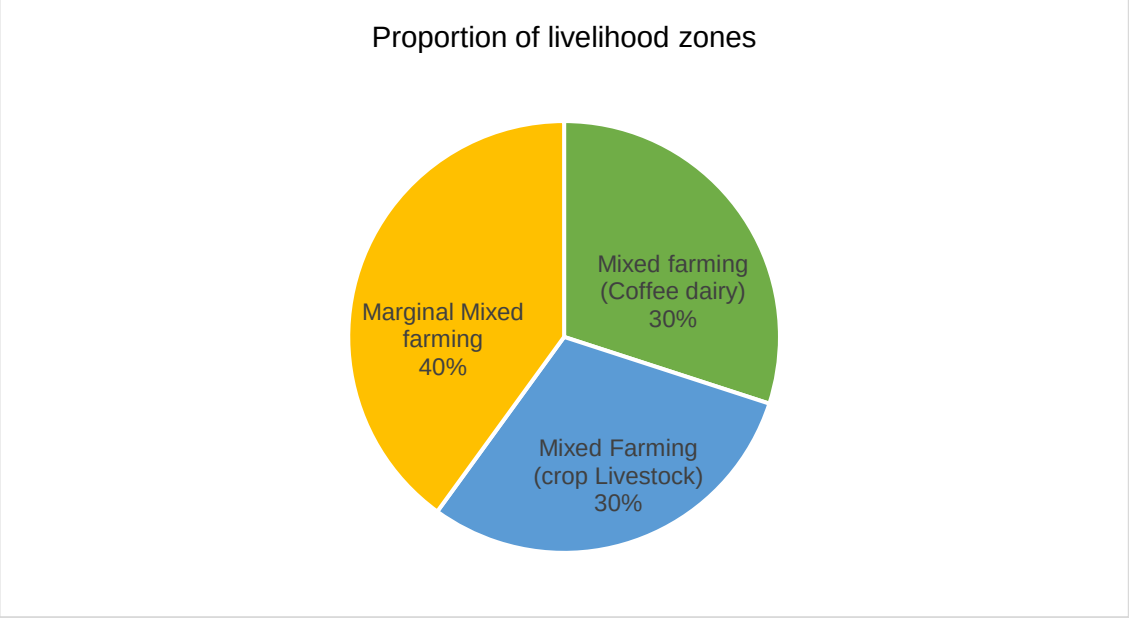

Figure 10: Proportion of livelihood zones

Source; National Drought Management Authority (2019)

3.9.3 **Livestock production**

In Makueni County, livestock production is practiced across the three main livelihood zones. Dairy production is mainly practiced in the mixed farming livelihood zones, however, farmers in the marginal mixed are reported as increasingly undertaking dairy farming (Government of Makueni County, 2016). This is due to the increased promotion and uptake of pasture production by farmers in conjunction with the county government and local NGOs, as reported by participants in this research. Dairy and poultry production in the marginal areas was projected to increase due to the construction of a milk processing plant in Kathonzweni and the construction of a poultry abattoir in Kitise by the county government in 2018 (Government of Makueni County, 2018a, 2018b). Goat production is predominant in the marginal and mixed farming (livestock/food crops and cotton) zones as shown in **Figure 11.** In the marginal zone, livestock production contributes approximately 50% to cash income, hence, a highly relied on source by farmers. Poultry, sheep and beekeeping are practiced in small-scale in all zones (Government of Makueni County, 2018b).

Figure 11: Galla goat[14] production in the semi-arid parts of Kitise-Kithuki ward
Source; Authors photo

[14] Galla goats, also known as Boran or Somali goats, are indigenous to the arid and semi-arid regions of Northern Kenya and are kept mainly for meat, although they also produce milk (Ahuya & Okeyo, 2006).

3.9.4 **The role of agriculture in realization of Makueni county vision 2025**

The Makueni County Vision 2025[15] highlighted how the county lagged in economic development and since independence, has realised a significant percentage of its population living below the poverty line (Government of Makueni County, 2016). Before the devolved system of governance took effect in 2013, the national Government had undertaken a series of poverty reduction interventions in the county covering the period 1999-2015. Through these initiatives, the poverty levels in Makueni (district) reduced from 71% in 1999 to 64% and 60.6% in 2013 and 2015, respectively. However, compared to the national average 36.1% in 2015/2016, Makueni county still ranked very high on poverty levels of 60.6% (Government of Makueni County, 2016, 2018b; The Kenya Institute for Public Policy Research and Analysis, 2020). The prevalent poverty level was linked to livelihood shocks, such as drought, which impact on crop and livestock production, low agricultural productivity, water insecurity, high unemployment, poor transport infrastructure and so forth.

The Annual Development Plan 2019-2020 reported that the county's food poverty incidence is 30.7% compared to the county's average at 32.5% (Government of Makueni County, 2018a) The Makueni County Vision 2025 underscores the impact of climate change and environmental degradation on food security and recommended multi-sectoral strategies to address these challenges. This included improved access to agricultural technologies, increased area under irrigation and improved agricultural production and agro-processing (Government of Makueni County, 2016). The policy document emphasised the role of extension services as technology dissemination. The agriculture sector was identified as one of the main drivers of the ADP[16] and the overall

[15] The Makueni Vision 2025 is a long-term county development plan which aims at accelerating an inclusive social and economic growth and development. The County's vision is "A prosperous value-based county with a high-quality life" and its mission is 'to transform the livelihoods of each household through accountable leadership that creates an enabling environment for inclusive, effective and efficient service delivery."(Government of Makueni County, 2016).

[16] In the 2019/2020 fiscal year the Annual Development Plan objectives were to economically empower community though increased household income through agricultural production for

achievement of the County Vision 2025. The ADP's top priorities included improvement of livelihoods through increased agricultural production (Government of Makueni County, 2018a).

The county government has invested in various agricultural projects as a way of stimulating local economic growth through agricultural development. The strategic development areas under agriculture, livestock and fisheries included value chain development, improved farm-inputs' access, promotion agricultural mechanisation and irrigation, pest and disease control, and improved marketing. According to the 2019/2020 County Integrated Development Plan, the county effort to improve the agriculture sectors was challenged by low crop and livestock productivity, lack of access to farm inputs and credit and the lack of market for the local produce. The document also noted that low adoption of technology and a poor linkage between the research organisation and extension services was impacting on the Government's effort to boost crop and livestock production in the county (Government of Makueni County, 2018b). In the 2018/2019 financial year, the county had planned to improve extension service delivery by employing more staff to boost technology dissemination and uptake by farmers (Government of Makueni County, 2018a). However, at the time of data collection, the county had not recruited new staff.

Since 2017, some of the key projects that the county invested in agriculture include the promotion of cereals and legumes, dairy, poultry, fruits, beekeeping, and beef production value chains. In collaboration with FAO, the county government supplied drought-tolerant crops to farmers and provided training to farmers on climate-smart agriculture to enhance production of cereal and legume crops. The county set up the Makueni fruit processing plant, and the Kikima and Kathonzweni dairy mini-processing plant to boost local dairy production. To support milk production, the county funded the upgrading of local dairy breed by supplying subsidized artificial insemination services to farmers. The county also distributed Galla[17] goats and indigenous breeds of poultry to farmers and supported the production of pasture feeds and honey processing in the semi-arid areas (Government of Makueni County, 2016, 2018b, 2019; Makueni County

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food security, the development of water infrastructure and youth empowerment (Government of Makueni County, 2018a).

Integrated Development Plan, 2013). To enhance local community access to financial support for agricultural and businesses enterprise, the county supported farmers cooperatives and established the Tetheka Fund[18] to boost farmers/community's individual collective action on business and investment. The county supported farm mechanizations through the purchase of five items of farm machinery and implements[19] including tractors, sub-spoiler, buckle hoe, and ploughs to help improve farm production (Government of Makueni County, 2018b, 2019).

Table 5: The estimated cost of programmes and projects in the CIDP 2018-2022

Sector	Recurrent budget (Ksh)	Development budget (Ksh)	Total budget (Ksh)	%Share
Health	9,549,081,528	13,209,304,049	22,758,385,577	28%
Environment Protection, Water & Natural Resources	1,041,727,112	17,283,750,000	18,325,477,112	22%
Energy, Infrastructure & ICT	744,098,661	16,377,200,000	17,121,298,661	21%
Public Administration & International Affairs	12,440,326,541	295,000,000	12,735,326,541	15%
Agriculture, Rural & Urban Development	1,291,022,436 20%	5,024,750,000 80%	6,315,772,436	8%
Education	1,384,837,925	1,187,000,000	2,571,837,925	3%
Social Protection, Culture & Recreation	304,298,202	1,350,000,000	1,654,298,202	2%
General Economic Commercial & Labor Affairs	306,579,648	800,000,000	106,579,648	1%

Source; Government of Makueni County (2018b)

As shown in Table 5, the agriculture sector includes the rural and urban development and, together, they receive an 8% share of the total projected budget for the period

[18] The Tetheka Fund is an amorphous fund created by the county government for which farmers apply and repay with zero interest to boost economic activities such as the purchase of heifers, irrigation, and processing equipment (Government of Makueni County, 2018b).

[19] The county government equipped the local Agricultural Mechanisation Services centre with farm machinery and implements for farmers to hire through their respective Ward Extension Officers.

between 2018-2022. The sector's budget ranks fifth after health, environmental protection, water and natural resources and energy and infrastructure. Critically, the health sector budget and the environment and energy and infrastructure's budget is 3.5 times and three times more than that of the agriculture sector, respectively. Furthermore, from the Table, 80% of the projected agricultural sector budget was for development, while only 20% was spent on recurrent activities (Government of Makueni County, 2018a). As noted earlier, most of the agricultural projects are on establishment of infrastructures such as dairy and fruit processing plans, markets, and input subsidies. Furthermore, the agriculture sector included the water department, thus, a significant part of the budget was for sinking boreholes, dam construction and rehabilitation (Government of Makueni County, 2018a).

3.9.5 County development activities towards improving extension service delivery

The development documents underscored extension services as the main driver of adoption of appropriate farming technologies by farmers and outlined measures to revamp the delivery of extension services. The 2019/2020 Annual Development Plan (ADP) outlined enhancing extension services for farmers by improving the skills and knowledge of county extension officers. To enhance technology uptake, the county government planned to reduce staff to farmer ratios by employing more staff which was termed as hindering effective service delivery (Government of Makueni County, 2018a). However, to improve extension service delivery the county government mostly budgeted for infrastructural development such as purchasing disease and pest surveillance equipment, establishment of plant and livestock mobile clinic to offer on farm trainings to farmers and revived the Makueni Agricultural Show. Other activities included the profiling of farmers, farmer groups and agricultural stakeholders to enhance service delivery and collaborations (Government of Makueni County, 2018a, 2019). The only budgeted activity that directly benefited extension service delivery was the purchase of motorbikes for field extension agents to enhance their mobility. In collaboration with the national government and stakeholders, the county sponsored field trips for farmers and extension staff to benchmark on agricultural issues such as water harvesting and the processing of sisal and dairy (Government of Makueni County, 2016, 2018a, 2018b; Makueni County Integrated Development Plan, 2013). In summary, even though the Makueni County development blueprints underscored the role of agriculture and extension services, the sectors compared to other sectors, was significantly underfunded.

3.9.6 **Agricultural programs in Makueni County**

The three major agricultural programs that extension agents mentioned are the Kenya Cereal Enhancement Project-Climate Resilient Agricultural Livelihood (KCEP-CRAL), National Agricultural and Rural Inclusive Growth Project (NARIG-P) and the Climate Smart Agriculture (CSA) project by the FAO. KCEP-CRAL project and the NARIG-P project are in five sub-counties, whereas the Climate Smart Agriculture project was implemented in the whole county. As reported by participants, the project objectives, target groups and mode of implementation and duties ascribed to extension agents differed across the projects.

3.9.6.1 Kenya Cereal Enhancement Project-Climate Resilient Agricultural Livelihood Project

KCEP-CRAL project is a partnership between the Government of Kenya (GOK), European Union (EU) and International Fund for Agricultural Development (IFAD). This is a flagship project under the Presidential Big Four Agenda as mentioned earlier. The overall aim of the program is enhancing the country's food security and boosting the income of smallholder farmers through increased productivity and profitability of key cereal commodities. This is in tandem with the goal of alleviating rural poverty and achieving food security, as stated in the Kenya vison 2030. The CRAL part of the project aims to empower county governments and beneficiary communities to sustainably manage the natural resource base and build resilience to climate change through community assets. The program utilizes the value chain approach by supporting farmers with input loans payable over a four-year period. The KCEP part of the project involves issuing smallholder farmers with e-vouchers which they use to access farm inputs such as seeds, fertilizer, and herbicides from locally appointed input-suppliers. Farmers who qualify to receive the program support are trained to ensure that they adopt agricultural practices resilient to climate change. The target cereal crops include maize, sorghum, millet, green grams and dolichos lablab. Further, the program supports farmers to transition from producing only for household consumption to growing surplus crops for the market. The role of extension agents is to support in the recruitment of farmers. Also ensure they access input e-vouchers adopt technologies promoted (Government of Makueni County, 2019).

3.9.6.2 National Agricultural and Rural Inclusive Growth Project (NARIG-P)

The National Agricultural and Rural Inclusive Growth Project (NARIG-P) aims at enhancing agricultural productivity and profitability to improved livelihoods and reduced vulnerability to targeted rural communities. The project is funded by the World Bank in

conjunction with the Government of Kenya (GOK). The County Ministry of Agriculture, Livestock, Fisheries and Irrigation and the State Department of Agriculture is responsible for the implementation. The primary beneficiaries of this project are rural smallholder farmers who are vulnerable and marginalized such as women, youth and identified vulnerable and marginalized groups (VMGs). The projects support communities to identify and implement economic activities which improve agricultural productivity, food, and nutrition security. It further strengthens producer organisations and value chain development through the organisation of common interest groups. Farmer groups are supported with resources, that is, grants to strengthen the production and marketing of selected value chains (Government of Makueni County, 2019). The project underscores the need to complement farming strategies which promote climate resilience with other technologies such as improved and drought-tolerant crop varieties and small-scale irrigation systems. This project is implemented in several wards and the duties of extension agents include supporting farmer groups and vulnerable and marginalized groups, capacity-building farmers on value chain development, business plans' writing and connecting farmers with key actors in their selected value chains.

3.9.6.3 Conservation Agriculture Project

Conservation Agriculture for smallholder farmer in dry lands in Kenya is a FAO program that started in 2015 and is implemented in eight counties. The project is part of the FAO's effort to support the countries' development priorities, as stated in the Big Four Agenda and Kenya Vision 2030. Conservation agriculture is a farming practice that integrates on soil, water, and agricultural resource management practices. It is based on three principles: minimizing tillage, maintenance of a cover crop or vegetation on soil surface and diversified crop rotation. In Makueni County, the project was implemented in all the wards and field extension agents were tasked with the role of disseminating CA technology. The project ended in 2019 when the researcher was collecting data, however, Ward Extension agents continued disseminating CA practices in their daily extension work (Mukembo & Edwards, 2015).

Other projects mentioned by extensionists are the Small Scale Irrigation and the Value Addition Project (SIVAP) 2015-2021. SIVAP's broad objective is to alleviate poverty by enhancing agricultural productivity and income and food security for the targeted marginalized communities. The project goal is to increase the production and productivity of high value traditional crops and small livestock, and to support the establishment and rehabilitation of new and existing irrigation schemes, respectively. The project works with local farmer organisations, women, and youth groups. In

Makueni, the project is implemented in five wards: Kasikeu, Mbitini, Emali/Mulala, Makindu and Nguu/Masumba wards. The project distributed an assortment of drought-tolerant cereals and legumes seeds to farmers for production and seed-bulking within Utangwa, Kyemwee Irrigation schemes and Muoni/Kikuu Catchment (Government of Makueni County, 2019).

Agricultural Sector Development Support Program Phase Two (ASDSP II) is one of the key programmes designed and executed by the State Government Ministry of Agriculture, Livestock, Fisheries, and Cooperatives and implemented in all the 47 Counties. The Government of Kenya funds the project in collaboration with Swedish International Development Agency and the European Union for five years (2017-2022). The project aims at enhancing food and nutrition security and agro-processing, by enhancing the capacities of priority value chain actors to boost the commercialization of agriculture. The key project result areas include increasing the productivity of priority value chains, strengthening entrepreneurial skills, improving market access, and strengthening structure and capacities for consultation, collaboration, cooperation, and coordination for key actors in the agricultural sector.

3.9.7 **The Governor's flagship projects**

3.9.7.1 Operation Mwolyo Out (OMO)-The one-acre rule Farm Pond technology

This is a development strategy that entails the construction of farm ponds. The ponds are able to support one-acre farming activities such as vegetable production, dairy and poultry farming (Government of Makueni County, 2018a). According to interviewed extension agents, the pioneer and promoter of the technology is a Bishop from the neighboring semi-arid part, Machakos County, who trains local farmers on how to harvest and store water in farm ponds. The governor was reported to like the technology due to its potential to boost local community's food security and, thus, end the long reliance on '*mwolyo*' [relief food].

3.10 **Agricultural extension actors in Makueni county**

3.10.1 **Introduction**

There are various government and non-governmental organisations (NGOs) working in Makueni county, all focusing on different social and economic areas. As summarised in Table 6 the organisations include governmental departments, NGOs, farmer organisations, community-based organisations, research organisations, private companies and research and academic institutions. The following sub-section describes indepth how these organisations are involved in extension service delivery.

The organisations were mentioned by extension agents as collaborating in their day-to-day extension activities.

3.10.2 **Non-Governmental Organisations (NGOs)**

World Vision, Anglican Development Services-Eastern (ADSE) and Lutheran World Relief are Christian humanitarian organisations, while Kitise Rural Development is a local community-based organisation. These organisations are all based in the semi-arid and arid parts of Makueni county which are prone to food and water insecurity, poverty, and that experience droughts due to harsh weather and environmental degradation. These NGOs also tackle economic, health and social issues such as rural finance, education, gender inequalities and HIV/AIDS.

3.10.2.1 World Vision

World Vision is an international Christian humanitarian organisation that works with children, their families, and local communities to alleviate poverty and promote justice. Although the organisation has a major focus on children's welfare and protection, it works on a range of development issues in collaboration with other governmental and non-governmental organisations. World Vision has been working in Makueni for over 45 years and its activities are based in the semi-arid areas of the county. The organization is now working in Kalawa and Mtito Andei wards where they have several projects running on children protection, water and sanitation and livelihood improvement. The drive to address water and food security issues by the organisation is also driven by weather and climate-change challenges. Alongside government and non-governmental agencies, World Vision promotes technologies that take into consideration climate change such as Zai pits and farm ponds. The organisation also supported the construction of sand dams across seasonal rivers to trap sand which, in turn, stores water for households and irrigation.

World vision works directly with extension agents whereby they engage the staff to capacity build farmer groups or support in monitoring project activities. World Vision also promotes farmer-to-farmer extension, and they engage local extension agents to train farmers as Trainer of Trainers (ToTs) and, later, supervise other farmers. Extension agents working in wards where World Vision supports farmer groups with farm ponds, are involved in designing the ponds as well as laying of the dam liner.

3.10.2.2 Kitise Rural Development (KRD)

Kitise Rural Development was started in 2005 by local community members to address water insecurity in the area, however, the organisation has since broadened its

mandate to tackle development issues such as sanitation, health, and livelihoods. KRD development activities target the communities of Kathonzweni ward, Mavindini ward and Kitise/Kithuki ward which are semi-arid and, thus, prone to droughts. KRD, in collaboration with other organizations, was implementing various sustainable livelihood initiatives such as climate smart value chains, (crops and livestock), pasture production, and agroforestry. KRD initiated farmer cooperative platforms which ensure farmers support each other towards marketing of the farm produce as well as to access certified farm inputs. Kitise Rural Development supported the Kitise Farmers' Cooperative with 'seed' money to jump-start their activities. KRD's mission is to enhance the capacity of the community members to enable them to run development activities. On that note, the organisation engages local extension agents to equip farmers with skills and knowledge through farmer field schools, trainings, demonstrations, and field trips.

3.10.2.3 Lutheran World Relief

LWR is a global Christian-based organisation which focuses on long term development and humanitarian assistance. Its development areas of focus are food security, livelihood enhancement, adaptation to climate change and response to emergencies such as droughts and floods. LWR has worked in Makueni since 2008 where it has continually supported smallholder farmers in the arid and semi-arid areas to manage the impacts of drought conditions. According to the project co-ordinator, the organisation chose to work in Makueni owing to the harsh climatic conditions and, at the same time, due to the potential the county exhibits. The organisation endeavored to empower local communities to tap into community assets to built strong local economies and to weather through drought and floods. Under agriculture development, LWR supports food and cash crop value chain development, promotes climate smart agricultural technologies, and supports the strengthening of farmers' marketing cooperatives. The organisation promotes water harvesting technologies such as Zai pits, farm ponds and terraces, and farmer group/cooperative organisations where farmers can build social and economic capital to support each other. At the time the researcher was collecting data, Lutheran World Relief was winding up its activities in Makueni county.

3.10.2.4 Anglican Development Services Eastern (ADSE)

Anglican Development Services Eastern is the development wing of the Anglican Church of Kenya (ACK) and the organisation's vision is to empower local communities to access secure and sustainable livelihoods. ADSE operation cover the four counties within

semi-arid and arid parts of Kenya which are prone to food and nutrition insecurity, water insecurity, poverty, drought, environmental degradation, and social challenges such as HIV/AIDS. ADSE's goals are to empower local communities to have stable food supplies, access quality water and to improve household incomes through agriculture-based livelihood. ADSE also supports communities to build their resilience to climate change activities as well to improve and protect the environment.

To support farmers to manage the negative impacts of climate change on food, nutrition and water security, ADSE works in collaboration with other organizations to drive a range of initiatives on climate change, horticulture, nutrition, and women's empowerment. Locally, ADSE collaborated with the Ministry of Agriculture and agencies such as Research Triangle Institute (RTI), Micro Enterprises Support Programme Trust (MESPT), World Vision and Kenya Plant Health Inspectorate Service (KEPHIS on mango value chain development. The mango fruit fly project is funded by the International Centre for Insect Physiology and Ecology (ICIPE) to support farmers to control and manage the pest.

3.10.3 **Private extension and advisory service providers**

Some of the private extension and research organisations working in Makueni County include Research Triangle Institute (RTI), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), agricultural input dealers, processing and marketing companies and farm implement dealers.

3.10.3.1 Research Triangle Institute (RTI)

Research Triangle Institute is an international non-profit research institute which is currently implementing a USAID project under the Feed the Future program known as Kenya Crops and Dairy Marketing Systems (KCDMS). KCDMS promotes development of high-value crops and dairy-value chains, and the project engages private business service providers and market actors to offer advisory services to their target farmer groups. According to the project coordinator, the organisation collaborates with public and private agencies to jointly form technical working groups which address the unique problems within each value chain. Some of the actors in these technical working groups are the Ministry of Agriculture (at count level), ICRISAT, Kenya Plant Health Inspectorate Services (KEPHIS), Micro Enterprises Support Programme Trust (MESPT), International Centre for Insect Physiology and Ecology (ICIPE) and Anglican Development Service-Eastern (ADSE).

3.10.3.2 International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) deals with dryland cereals, legume breeding, and seed multiplication. The organisation is also funded by USAID under the Feed the Future project to promote food security through the production of climate smart cereal and legume crops such as sorghum, pigeon peas and green grams. In their day-to-day work, ICRISAT works directly with local extension agents, farmer groups and farmer trainers (TOTs). ICRISAT only breeds crop varieties for the dry areas and, therefore, its activities are based in wards within the semi-arid and arid parts of parts of the county. The organization has few field staffs and, therefore, relies on local extension agents to facilitate farmer outreach activities such as trainings, demonstrations, and field days.

3.11 **Conclusion**

The context of this case study shapes the research findings. The subject of this case study was public extensionists working at the ward administration level in Makueni County in Kenya. The chapter describes the broader policies that shape how extensionists work. The chapter has illustrated the transition of agriculture in Kenya pre- and post-independence and the current transition from the national government to devolved county government. The section describes the duties and responsibilities of ward extensionists and how their day-to-day work is linked to the County Ministerial Performance Contract. Makueni County has been discussed in depth in regard to agro-ecological conditions, livelihoods, agricultural sector projects and funding and the extension staff establishment. The last section describes the key agricultural development projects and the key extension actors in Makueni county.

Table 6: Summary of key agriculture and extension actors in Makueni county who were mentioned by extensionists.

Organisation	Examples	Role in Extension
Farmers and farmer groups	Mukambithia Farmer Group	Farmer to farmer extension
Farmer cooperative societies	Kikima Dairy Cooperative society	Extend
Community-based organizations	Kitise Rural Development (KRD), Utooni Community-Based Group	Extend, facilitate extension
Non-governmental organizations	World vision, Anglican Development South Eastern, Lutheran World Relief, CARITAS, DRYDEV	Extend, facilitate extension
Private companies (Agri-inputs companies, consultants	Bayer East Africa, Panner, Farm Chem, Safaricom, East African Breweries Limited	Extend, facilitate extension, Marketing
State and county government departments	Ministry of Agriculture, Livestock, Fisheries and Cooperative development National Drought Management Authority	Extend, coordinate extension providers
State research organizations	Kenya Agricultural and Livestock Research Organisation (KALRO)	Develop and disseminate technologies
International research and development organizations	ICRISAT, FAO, RTI, International Centre of Insect Physiology and Ecology (ICIPE), Red Cross, World Food Program,	Research, facilitate, extend
Donor agencies and bilateral organizations	USAID, EU, WORLD BANK, IFAD, DANIDA, GIZ, SIDA	Fund, facilitate and extend
Universities	South Eastern Kenya University (SEKU) Kenyatta University	Train, extend, research

Source: Own

CHAPTER 4 RESEARCH DESIGN

4.1 Introduction

In social and organisational studies, the single most profound acknowledgement is that much of the world with which we deal is fundamentally socially constructed (Gioia, Corley, & Hamilton, 2013; Long, 2001). This study was conceived on an understanding that extensionists are knowledgeable of their lived world and can explain their actions and intentions. This research placed emphasis on the day-to-day experiences of extensionists as they interact with extension actors and engage with diverse institutional arrangements which impact on how they deliver extension services to farmers. In this study the questions the research answered are:

(1) What do public extension agents do?

(2) How do they do what they do?

(3) What shapes how public extension agents do what they do?

These questions demanded an exploration of the day-to-day practices of extension agents guided the design and strategy for the methodology. In this chapter, I describe the research paradigm, research approach, research design and research case selection. The last sub-section describes the research data collection methods and process and data analysis. The final part of the chapter describes ethical dimensions and the procedures used to guarantee quality.

4.2 Research rationale

This research was influenced by actor-oriented social constructivist theory which conceptualizes social life as “work-in-progress” (Long, 2001). Social constructivism has long been applied in studying rural development and social change and authors such as Long (2001) drew upon the tenets of constructivist research and thinking to posit that people can construct knowledge, generating ways of making sense of their environment, and taking action to achieve their goals. The study recognises that the context shaped how extensionists work.

The researcher conceptualised extension practice as an outcome of the interfaces between different extension actors, their social interaction, negotiation, and relationships. The study aimed at understanding, in depth, the practical day-to-day practices of extension agents working with smallholder farmers in rural Kenya and what shapes how they do what they do. The research drew upon context-specific experiences of Kenyan extensionists to capture the complexity of extension practice to

inform policy and practice in developing countries. The researcher emphasized the experiences of extension agents and how they make sense of their day-to-day extension work, therefore, guarding the researcher from imposing her prior understanding of the phenomena of study, as suggested by Gioia et al. (2013).

4.3 Research approach

The research study used a qualitative case study design. Qualitative case studies have been termed as suitable for exploring the complex world of lived experience from the point of those who live it and within their natural context (Cavaye, 1996; Flyberrg, 2010; Ford et al., 2010). Research studies that use qualitative methods tend to be based on an acknowledgement of the significance of the subjective and experiential 'lifeworld' of human beings and underscores the multiple realities and socially constructed meanings that exist in social contexts. Qualitative methods allowed the researcher to gain an understanding of the field of extension by interacting with participants and their activities within their natural environment. The researcher's proximity to the field allowed her to see, experience and document the social interactions as argued by Gioia et al. (2013). While the researcher agrees with scholars who argue that qualitative research data collection, analysis and interpretations are long and time-consuming (Ford et al., 2010), this ensured rigor.

4.4 Case-study research design

The research applied a case study approach. Case studies have been found useful for carrying out empirical inquiries which seek to investigate phenomena within a real life context and using multiple data sources (Baxter & Jack, 2008). Simons (2009) indicates that case studies are preferred in the social and education fields since they enabled a researcher to explore in depth the complexity and uniqueness of a phenomenon and from multiple points of view. In this research, a case study design enabled the researcher to explore the 'why,' 'how' and 'what' of extensionists and from multiple perspectives, as suggested by Marshall and Rossman (2016) and Thomas (2017). Wise et al. (2014) acknowledges that, day-to-day extension work cannot be separated from the cultural, economic, environmental, political, and developmental context under which it occurs. This, therefore, supported the use of a case study to explore the topic of study since it acknowledged the uniqueness of phenomena and the embeddedness of the phenomenon within the broader context (Simons, 2009). A qualitative case study was a suitable design to empirically explore how extensionists work, as it allowed the researcher to embrace the lifeworlds of the extensionists, their

multiple realities, and their socially constructed meanings within the contexts of their work.

This study was a single case study by design since it enabled a critical exploration and understanding of how extensionists interact with their context (Baxter & Jack, 2008; Stake, 1995). The researcher employed multiple qualitative data collection methods, that is, interviews, physical observations, and documentation to enable the exploration of what extensionists do and how they do what they do. A variety of data-gathering tools created an opportunity to explore and describe multiple and different realities about how extensionists do their work, as noted by Stake (1995)..

4.5 **Case selection**

Agricultural extension agents, and the county extension system of which they are part, were the focus of this study. The phenomenon under study was the roles of extension agents working at the ward level, which is lowest country administrative level. Extension agents where therefore the unit of analysis. The research study aimed to interview at least one extension officer from all the 30 wards. Thus, the only criteria applied was that the participants had to be working as extensionists at the ward administrative level at the time of data collection. No other criteria were applied in selecting research participants.

The research was carried out in Makueni County which lies at the south-eastern part of Kenya. Agriculture is the key source of livelihood for communities living in the county and is estimated to support about 78% of the total population primarily through crops, fruits, and dairy value chains. The county lies within the arid and semi-arid areas of the eastern part of Kenya (Makueni County Integrated Development Plan, 2013). It is predominantly semi-arid, representing 63% of the total land area. The county has five distinct agro-ecological zones which support a range of farming and livelihood activities (D'Alessandro et al., 2015; Makueni County Integrated Development Plan, 2013; Mutua et al., 2016). Owing to the inherent diverse ecological and farming characteristics of Makueni County and the dominance of small-holder farmers, it was a good site for the researcher to study the work of extensionists. The existence of diverse ecological zones could potentially show a distinct difference in what and how of extensionists' work. The county is an area the researcher has never worked in before and, therefore, reduced bias on how she interacted with participants. The county is only 200Km from the researcher's rural home, hence, the costs of transport and movement were moderate and within budget. The county's good roads, coupled with availability of

multiple means of transport, enabled the researcher to move from one part of the county to another with ease, including in the wards regarded as the most remote.

4.6 Participants and data collection methods

Data was collected through in-depth interviews, document review and unstructured participant observations. Multiple data collection methods enabled the researcher to conduct a thorough investigation of what and how extensionists work and why. Multiple sources of data allowed the exploration of the research participants from a broad range of perspectives, as argued by Davies and Dodd (2002). Interviews were the primary source of data, while document review and participant observations were the secondary sources. The researcher carried out in-depth interviews with participants using semi-structured interviews. This allowed her to gain both real-time and retrospective accounts about the what, how and why of extension practice, an approach used and advocated by other scholars (Gioia et al., 2013; Stake, 1995). A semi-structured interview guide allowed the researcher to tailor questions to allow interviewees to talk specifically and reflexively about how and why they do what they do. The semi-structured interview structure enabled the researcher to build rapport and trust with the participant which, as O'Leary (2005) states, is paramount for a good interview. The flexible interview guide allowed a natural flow of conversation which as O'Leary (2005) states can gave rise to unexpected information from the interviewee. All interviews were conducted in person by the researcher. The interviews were accompanied by brief notetaking on some of the terms and issues about which participants talked. With the consent of the participants, interviews were recorded on a digital recorder. However, one participant did not give consent to a recorded interview and the researcher wrote down the interview proceedings. Recording the interviews was valuable as it enabled the researcher to concentrate on the interviewee at the time by giving them her full attention and it allowed for a natural flow of conversation, hence enhancing the questions' articulation and probing for an in-depth exploration of the subject.

4.7 Research data collection

The researcher started data collection process in early July where she visited the County Agricultural Office to introduce herself and share her research intentions with the County Director of Agriculture. The researcher met the Deputy Director of Extension and shared her proposed research work and put her formal request to carry out data collection in the county. The director acknowledged the value of the research

to extension service delivery in the county and gave a formal approval to start her data collection process. The director introduced the researcher to several sub-county agricultural officers and provided phone contacts for most the ward agricultural officers (WAO) who oversee extension activities at the field level. Since he was knowledgeable of the area, the director gave the researcher a virtual tour of the county and further advised her on how to travel across the county. The director shared technical reports which captured the key extension programs, extension collaborators and summaries of extension field staff establishment. The researcher used the information gathered from the Deputy Director to plan her field work.

4.8 **Actual Field work**

The researcher started fieldwork by visiting ward agricultural offices near the county headquarters. With the information gathered, the researcher contacted sub-county agricultural officers who shared phone numbers of the ward agricultural officers (WAO). The researcher started her data collection activities in the wards close to the county headquarters and finished with those at the farthest parts of the county. The researcher made calls to Ward Agricultural Officers in Makueni Sub-County and arranged for individual interviews at their offices. As shown in the Table 7 interviews began with extensionists in wards near the county headquarters, then advanced to the hilly areas before finishing with the wards at the farthest end of the county. The ward agricultural offices were some distance apart and some cases were in remote areas, therefore, the interviewees helped the researcher to plan how to access the areas. On two occasions, the researcher met interviewees at the sub-county agricultural offices, hence, saving on time and costs of transport. All the targeted ward extensionists had phone contacts for each other. Through a snowballing process, the researcher was able to meet and interview 80% of the ward agricultural officers.

After completing interviews with ward officers, the researcher went back to the Deputy Director of Extension and reported on her progress. She gathered information about stakeholders who supported agriculture and extension services in the county, most of whom had been mentioned by the ward officers. The Director provided the researcher with the phone numbers of key informants in those organisations and further called some and introduced the researcher. FAO's county office was within the same premises as the County Agricultural office, while RTI and ICRISAT shared an office and, therefore, it was easy for the researcher to reach out to the participants and make appointments. A ward agricultural officer physically walked and introduced the researcher to the management of Kitise Rural Development where she was able to

meet and arrange for an interview with the Program Manager. Another ward agricultural officer, who worked closely with the World Vision and the Lutheran World Relief (NGOs), provided the phone contacts of program managers whom she contacted and arranged for interviews. The researcher introduced herself to staff from the government authority in charge of drought response and livelihood enhancement who voluntarily agreed to participate in an interview.

4.8.1 **Interviews**

The target participants for this study were public agricultural extension agents working at the ward level and actors from organisations offering or supporting agricultural and extension delivery in Makueni County. The researcher focused on extension agents working at the ward level, since they mostly interacted with farmers on a day-to-day basis and were responsible for the implementation of extension activities as defined in the National Agricultural Extension Policy (Government of Kenya, 2010, 2017a, 2018). The research covered all five agro-ecological zones to gain insights into how extension agents in this diverse condition do their work. As summarised Table 7 the researcher, interviewed twenty-six extension agents from twenty-five wards, therefore, representing 80% of the total number of wards. Of the twenty-six interviewed, only one participant had been deployed as a Livestock Extension officer, the rest were deployed as Agricultural Extension officers. As shown in Table 7 the researcher also interviewed eight individuals from organisations who were frequently mentioned by the interviewed extension agents as collaborating in various agricultural and extension activities. Four participants were drawn from local and international NGOs based in Makueni county, while two participants were drawn from international research and development organisations implementing a crop and livestock value chain project, and the other specialised in the breeding of legume crops for arid and semi-arid areas. The researcher also interviewed an officer in charge of livelihood and climate resilience project from a government parastatal that is partnering with the Ministry of Agriculture in a program addressing food security and livelihood enhancement in the county. The researcher interviewed an officer from a FAO-UN-affiliated organisation which was often mentioned by extension agents across the county due to their collaboration in implementing a project on climate smart agriculture.

All interviews were carried out between July and October 2019 and most of the participants were welcoming and collaborated during the interview. On average, the interviews lasted 60 to 90 minutes and all were digitally recorded except one where the participant did not consent to recording. All the interviews were mostly in English;

however, they were interjected by the local dialect (Kikamba) and the national language (Kiswahili). The interview protocol focuses on the research questions, however, the protocol was revised as the research progressed to capture new insights and to fit the twists and turns involved in understanding the phenomenon of study, as suggested by (Gioia et al., 2013; Morris, 2015). For instance, at the start of the study, the researcher intended to investigate how extension agents were supporting farmers to adapt to climate change, however, the first interview uncovered significant information which necessitated a revision of the protocol. The researcher realised that even though her questions where centred around climate change, the participants (in this case extension agents) explained that climate change was not a stand-alone extension activity but was a cross-cutting issue they mainstreamed in all other extension activities. The researcher therefore revised and expanded her interview protocol to uncover new ideas and information from the participants. As mentioned earlier, the interview protocol for participants from organisations mentioned as collaborating with public extension agents, was tailored to fit the organisation's work and how it related to the subject of study. According to Gioia et al. (2013), abiding by standardised interview protocol, as suggested by some research studies, potentially limits the ability of the researcher to uncover new information, thus impacting on the overall research synthesis.

Most of the wards were managed by only one staff member with only a few having two extension staff. The initial plan was to interview at least one staff member from every ward, but the researcher was unable to interview staff from three wards, Emali, Kithungo/Kitundu, and Kilungu, since staff were away on leave or attending training. However, the interviewed extensionists represented the five agro-ecological zones and represented 80% of ward extension officers. Recruitment of additional interviews stopped when it was assessed that limited new information was emerging.

4.8.1.1 The interview contents

Interviews followed a semi-structured format. The interviews with extension agents began with a request to talk about their roles and to describe their responsibilities and how they carry out their roles. Extension agents were also asked to talk about the individuals and organisations with which their departments interacted, and how and why they interact. The researcher probed for more information from the participants for clarity and in-depth understanding of the issues.

4.9 Secondary data

Secondary data was collected through the help of extension agents at both the county offices and the ward offices. The documents accessed included the Ministry of Agriculture's monthly and quarterly extension and food situation report, the Ministry's 2018/2019 and 2019/2020 performance appraisal and contract reports, and the Ministry of Agriculture and Livestock development staff establishment reports. The researcher also accessed online the National Extension Policy and the Agriculture Sector Development Strategy 2010-2020 (Government of Kenya, 2017a) and the Kenya Climate Smart Agriculture Strategy 2017-2026 (Government of Kenya, 2017b). The researcher accessed data and information about the county government development, finance, and planning reports from their website repositories. These included Makueni County Vision 2025, Makueni County Integrated Development Plan (CIDP) 2018-2022 and Makueni County Performance Contracts for the 2018/2019 fiscal year. Information derived from these documents was utilised to understand the context of study and corroborate some of the information gathered during interviews and observations. Information gathered from documents enriched the case study, enhancing the data analysis process and outcomes, as suggested by Thomas (2017).

4.9.1 Unstructured participant observations

In October 2019 the researcher attended a National World Food Day celebration held at Makueni County which gave the researcher an opportunity to interact with extension agents. Other actors were farmers and exhibitors, who were mainly Ministries, agricultural input companies, agro-processing companies, farmer cooperative societies, local and international non-governmental organisations and individual.

The researcher carried out unstructured participant observations through two individual farm visits, a farmer group visit, and a national/county agricultural event. Unstructured participant observations involved observing farmers and extension officers as they carried out activities. As an observer, the researcher was physically present to observe, and record information related to the subject of her research from the participant's natural environment. The observations allowed the researcher to gain a picture of the field and "to make a sense of the setting" which is challenging to comprehend when only interviewing participants, as argued by Simons (2009). Documenting the observed events helped in building a rich description of the case of study. The observations helped the researcher comprehend well what participants talked about in the interviews. For instance, many participants mentioned conservation agriculture and Zai pit technologies, however, the researcher had never seen any of these technologies.

By visiting farmers, the researcher was therefore able to see both technologies and to listen as farmers described how they worked with extensionists to implement them. With the assistance of one Sub-County Agricultural Land and Development Officer, the researcher visited two farms and a farmer group. The first visit was to a widow who was practicing the Zai pit technology. The farmer had donated a space in her farm to her group, known as *Mukambithia* (You will find me) Women's Group, to excavate a farm pond and establish a vegetable garden. The local extensionists had trained the farmer group on vegetable production and further supported the group to apply for a small amount of funding from the county government to excavate the farm-pond. However, elephants had invaded her farm in search of water, tramped on the farm pond and destroyed the vegetables and dam liner as shown in **Figure 12**.

Figure 12: A picture of the *Mukambithia* Women's group farm pond destroyed by elephants

Source: (Author photo)

The researcher visited a farmer who led a farmer group that had been trained by local extensionists on conservation agriculture and the production and group marketing of cereal crops. The farmer had donated land to build a village cereals' aggregation centre through the support of other local farmers, World Vision, and Lutheran World Relief. The centre was used for aggregating harvested crops such as sorghum, green grams, and maize. The researcher also visited a community-based organisation named Nzamu which was running an agro-input shop in the local market where they sold

farming inputs to the local farming community. Local extensionists had trained the group on mango seedling nursery establishment and beekeeping. The researcher visited a household of two group members who were individually growing mango seedlings and keeping bees as a source of livelihood.

4.10 Data analysis

To answer the research questions, the researcher used an iterative qualitative data analysis process to systematically tease themes and patterns from the collected data, as suggested by De Wet and Erasmus (2005) and Miles and Huberman (1994). In the first phase of analysis, the researcher transcribed all the primary data collected through interviews, then closely and repeatedly read all the transcripts to interact with the data as a whole (De Wet & Erasmus, 2005). The researcher re-read the transcripts several times to 'listen to the voices of participants', as suggested by Miles and Huberman (1994, p. 58), get a preliminary understanding of what extensionists do. During the process, the researcher noted down both regularly occurring phrases and unique experiences of extensionists and generated a broad category of what extensionists do. The researcher engaged her supervisors throughout this first order analysis to tease out ideas from the data and to ensure that she remained open, creative, and insightful and to avoid getting lost in the data (Gioia et al., 2013).

The selected phrases were assigned to themes using terms used by participants on what they do, for example, 'Implement Conservation Agriculture'. At this point, the researcher imported the data to NVivo software program and continued to code each transcript according to the themes emerging from the data and those relating to the research questions. The NVivo software enabled the researcher to organise her data around similar themes. Further analysis of the data was done within and across the data sets, teasing out further themes and merging similar themes and relationships (De Wet & Erasmus, 2005; Gioia et al., 2013). The researcher continuously engaged in discussion with her supervisors to ensure the interpretation of the data passages was consensual and rigorous. Five broad themes and sub-themes that explained what extensionists do, emerged from the data analysis. The last step involved the researcher dialoguing the data to tease out information from the themes and sub-themes on what shapes what, how and why extensionists do what they do. The NVivo software program helped the researcher to speedily and systematically organise the data and enabled the researcher to visualise links and hierarchies between the themes and sub-themes to interpret the data and answer the research questions as shown in Figure 13 and 14.

Figure **13: NVivo thematic analysis in progress**

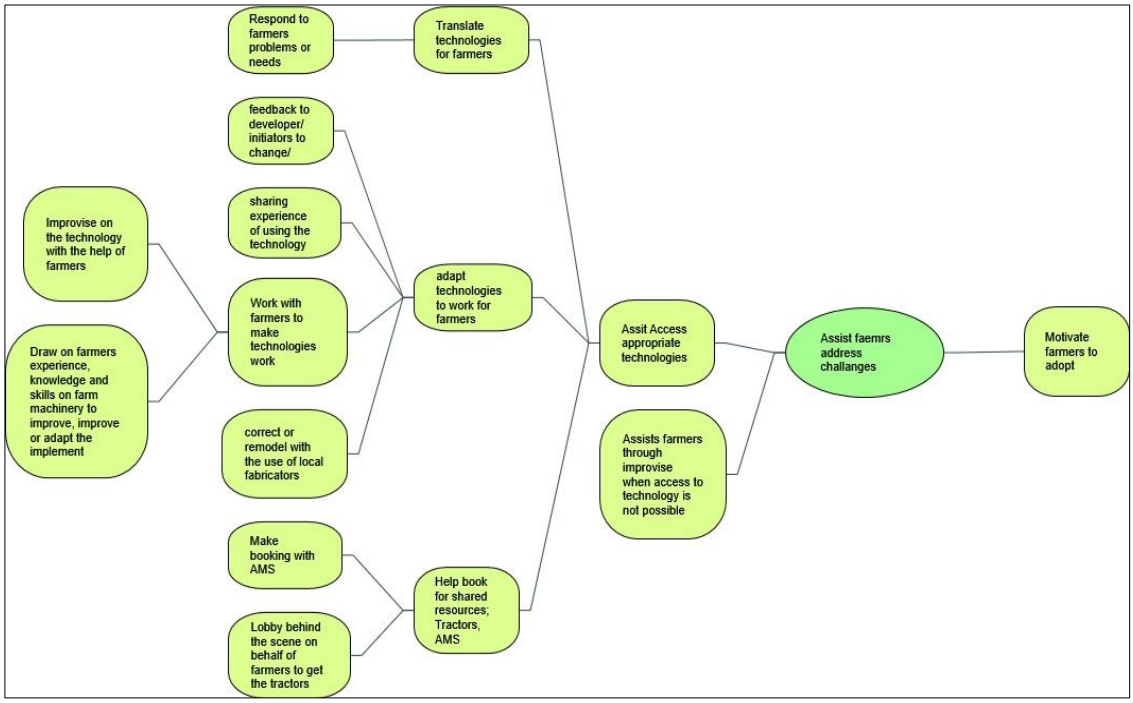

Figure 13: NVivo thematic analysis in progress

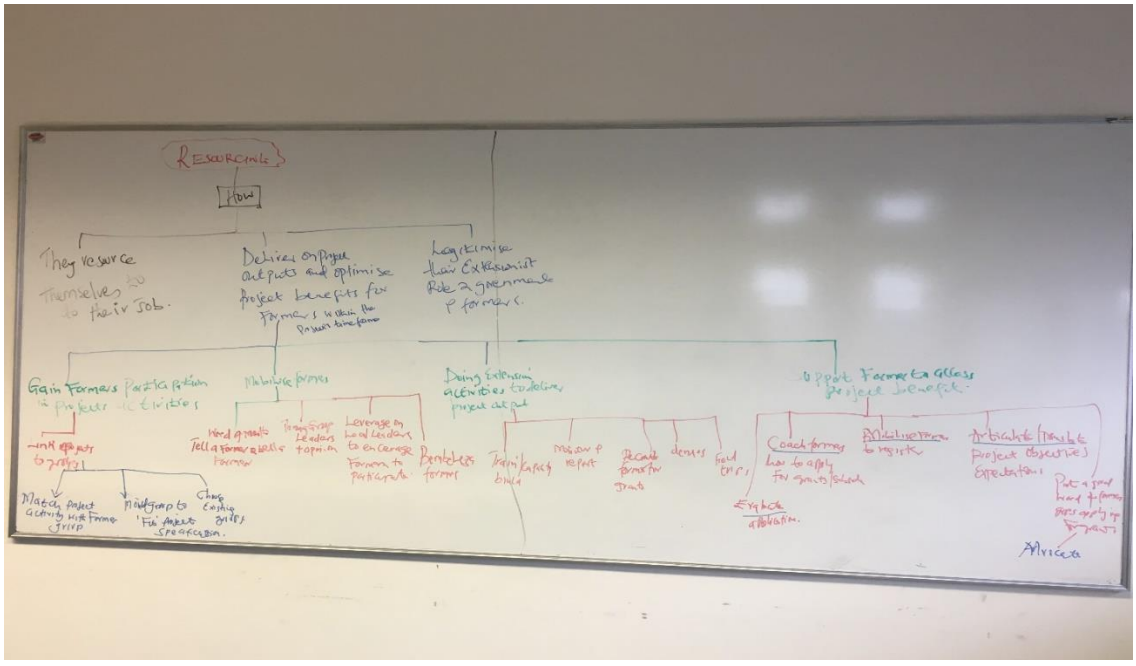

Figure 14: Manual thematic analysis in progress

4.11 Ethical issues

The research adhered to the set standards for ethical conduct in research involving human participants as required by Massey University's Human Ethics Committee. This research was categorised as low risk as the researcher maintained high levels of integrity in the process of collecting, analysing, and reporting the data as outlined in the ethical clearance. The research responsibly handled participants' information by storing the data collected in a password-protected google drive. All targeted participants were over 18 years of age, and, at the beginning of the interview, the researcher sought their informed consent. Participants read and voluntarily consented to participating in the study. Consent was sought to record interviews and the researcher explicitly disclosed the objectives of the research study and how she planned to utilise the data gathered. Participants were given the opportunity to decide to participate or not. All participants whose participation was sought consented to do the interview and all except one consented to the interview being recorded. In the case where a participant requested not to be recorded, the researcher recorded in writing the interview conversation in her notebook. As a way of maintaining confidentiality, the names of the participants are not used in the thesis. The field observations were done with the full knowledge of the person or group with whom the researcher interacted. The participants also consented to the taking of photos of their farms and other phenomena of interest such as farm ponds, stores, and tree nursery beds.

Figure 15: The researcher visiting a farmer managing a commercial mango seedling nursery

Source; Authors photo

Table 7 is a summary of the research participants and the farmers, groups the researcher visited, and the events attended.

Table 7: Summary of the research participants

Data collection methods	Sources
In-person Interviews	25 Ward Agricultural Extension Agents 1 Livestock Extension Agent
Key informants	1 County deputy director in charge of extension 1 County deputy director in charge of livestock 1 Program officer-FAO Makueni 1 Program manager – World Vision Makueni 1 Project staff – Lutheran World Relief 1 Project accountant -Kitise Rural Development (KRD) 1 Project officer-Food security-Anglican Development Service-Eastern (ADSE) 1 Program officer-Kenya Crops and Dairy Marketing Systems (KCDMS) I Program manager-National Drought Management Authority (NDMA) 1 Breeder – International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)

Participants' observations	1 Farmer • Member of farmers' group implementing Climate Smart Agriculture • Her farm hosted the group's farm pond and a vegetable garden 1 Farmer leader • A group leader for Community-Based Organisation (CBO) for farmers practicing CA. • A coordinator for the hiring of group CA soil rippers (implements). • Coordinates group produce aggregation and marketing. 1 Farmer group • The group owned an agro-input shop. • The farmers were implementing CA • Farmer practiced mango fruit production, tree nursery and honey production. Attended World Food Day celebration
Secondary data	i. County Development Plan ii. Makueni County Development Plan (MCDP) iii. Makueni County Vision 2025 iv. Makueni County Performance Contract v. Makueni County, Ministry of Agriculture Performance Contract vi. County Extension activities report vii. County Extension staff establishment report

Date of interview	Names (Pseudo)	Age of staff	Education level	Length of service	Areas worked
10/07/2019	Gladys	Late 50S	Diploma in Agriculture and Home economics	Over 30 years	Worked within and outside Makueni county
10/07/2019	David	Mid 50s	Started with a Diploma, Degree in Agriculture Masters	Over 30 years	Worked only in Makueni County
11/07/2019	Alice	Late 50s	Diploma in Agriculture Degree in Agriculture and Human Ecology	Over 30 years	Worked only in Makueni County
16/07/2019	Benson	Early 30s	Diploma in Agriculture	10 years	Worked within and outside Makueni county
16/07/2019	Mwatu	Late 40s	Diploma in Livestock management	10 Years	Worked within and outside Makueni county
16/07/2019	Robert	Mid 50s	Certificate in Agriculture Diploma in agriculture	Over 30 years	Worked within and outside Makueni county
16/07/2019	Maurice	Late 50s	Diploma in Horticulture	Over 30 years	Worked within and outside Makueni county
17/07/2019	Jacob	Early 50s	Degree in Agriculture	Over 20 years	Worked within and outside Makueni county
18/07/2019	Rita	Mid 50s	Diploma in Agriculture and Home Economics	Over 30 years	Worked only in Makueni County
18/07/2019	Josephat	Mid 30s	Diploma in AGED Degree in AGED (Not graduated)	Over 10 years	Worked only in Makueni County
21/07/2019	Ndolo	Late 50s	Certificate in Agriculture Diploma in General	Over 30 years	Worked within and outside Makueni county

Date of interview	Names (Pseudo)	Age of staff	Education level	Length of service	Areas worked
			Agriculture		
24/07/2019	Abel	Early 30s	Diploma in Horticulture	Over 10 years	Worked within and outside Makueni county
24/07/2019	Jackline	Early 40s	Diploma in Agricultural Education and Extension	Over 10 years	Worked within Makueni county
6/08/2019	Shadrack	Late 50s	Certificate in Agriculture Diploma Agriculture	Over 30 years	Worked within and outside Makueni county
07/08/2019	Jimmy	Late 50s	Certificate agriculture Diploma in Horticulture	Over 30 years	Worked within and outside Makueni county
7/08/2019	Lydia	Late 50s	Diploma in Home Economics	Over 30 years	Worked within and outside Makueni county
08/08/2019	Emma	Late 50s	Certificate in Agriculture and Home Economics Diploma in Horticulture Degree Horticulture	Over 30 years	Worked within and outside Makueni county
9/08/2019	Ruth	Mid 50s	Certificate in Agriculture	Over 30 years	Worked within and outside Makueni county
13/08/2019	Musembi	Late 50s	Diploma in General Agriculture	Over 30 years	Worked within and outside Makueni county
13/08/2019	Mutembei	Early 50s	Degree in Horticulture	Over 10 years	Worked in private sector-vegetable Worked within and outside Makueni county
13/08/2019	Mwololo	Early 50s	Certificate Agriculture Diploma in Horticulture	Over 30 years	Worked within Makueni county
14/08/2019	Oscar	Late 50s	Certificate in Agriculture	Over 30 years	Worked within Makueni county,

Date of interview	Names (Pseudo)	Age of staff	Education level	Length of service	Areas worked
			Diploma in Agriculture		
14/08/2019	Robert	Late 50s	Diploma in Agriculture	Over 30 years	Worked within Makueni county
20/08/2019	Evelyne	Late 50s	Diploma in Home Economics Degree in General Agriculture	Over 30 years	Worked within and outside Makueni county
21/08/2019	Kingston	Early 50s	Diploma in Agricultural Engineering	Over 25 years	Worked within and outside Makueni county
3/09/2019	Nzangau	Late 50s	Diploma in Agriculture	Over 30 years	Worked within and outside Makueni county
10/09/2019	Project Staff	NGO 2			
12/09/2019	Project Staff	CBO			
12/09/2019	Project Staff	Research Organisation 2			
12/09/2019	Seed breeder	Research Organisation 1			
13/09/2019	Project Staff	NGO 2			
13/09/2019	Hillary	Government Parastatal			
02/10/2019	Project staff	NGO1			
03/09/2019	Project Staff	NGO 3			

CHAPTER 5 RESULTS

5.1 Introduction

In this chapter, the findings of what public extensionists in Makueni County extensionists do, how and why they do what they do, is reported. In summary, this chapter begins with an exploration of how extensionists view themselves, their job and their duty to farmers. This section sets the ground for a description of what extensionists do. The second section describes how extensionists service farmers' needs, including the transition to new livelihoods. The third and the fourth section discuss in depth how extension agents glean resources for farmers, support their day-to-day extension work and how they navigate through the role of technology transfer respectively. The fifth section explores extensionists' multiple projects' activities and how they optimize benefits for farmers. The last section discusses how field extension staff draw support from each other to address the needs of farmers and support agencies working with farmers. The chapter concludes with a summary of the key findings which emerged from this research. Throughout the chapter, verbatim data quotes are used to illustrate what, and how of extensionists and they are indicated by the use of italics. Pseudo names have been used to identify the research interviewees.

5.2 How extension agents view their job

The researchers interview with extensionists included personal stories of their journey as extensionists and the following quote is a reflection of an extensionist who served for over 30 years in different parts of the country. The narration of the participants encapsulated what it is to be a public extensionist.

> *… when I was transferred to Makueni county, I was asked by one of the senior county officers why I arrived late…. he wanted me to treat him like a boss…but [in my former district] I did not know the language of 'a boss.' So, I told him that I was in Nairobi applying for my baggage allowance. He said that I was being rude to him so because of that he posted me to this Ward. I told him that it was okay with me as I was ready to move over. But the office clerk told me that I had been taken to the most remote ward…So the 'boss' punished me. But I told him that I was ready to work anywhere and to me there was nowhere that is remote. So, this ward is considered to be the worst place in the county. But I am a public servant, and I am free to serve anywhere. (Shadrack-Ward Agricultural Officer)*

It emerged from the study that the majority of the participants worked to meet farmers' needs and they derived satisfaction from seeing farmers progress in their endeavours. An extensionist who worked for over 25 years attributed his commitment to deliver extension services to farmers, even when resources remained scarce and uncertain, to an intrinsic love for extension work.

> *The satisfaction I get is when I help a farmer to move [from poverty] or get [income] that is my satisfaction. That is why sometimes I use my resources to meet the needs of my farmers. (Jacob-Ward Agricultural Officer)*

> *…since 2013 nobody should cheat you that there has been any meaningful [resource] support … but we are still working…I work because I love the job and I want to support our farmers. (Josephat-Ward Agricultural Officer)*

An extensionist who delayed our research interview for three hours due to impromptu project meetings and farmers' inquiries, described how extension work demands could potentially make a staff member go ‘crazy.’ However, she quoted her zeal and self-drive for extension work as what sustains her motivation to work.

> *I was to attend to you [the researcher] in the morning, but now it is past 2PM. ... (Signalling by hand) ... I have been in that NARIGP meeting. There is another group I am meeting with in the afternoon so it always hectic. I have a lot of paperwork to do. I have KCEP reports to do, I have an assignment from NARIGP, and farmers are now also walking in. There are some who have been waiting since morning. In fact it is because I have the passion and self-drive for my work. Otherwise it is easy to go crazy. (Evelyn-Ward Agricultural Officer)*

The majority of interviewed extension agents expressed a sense of care towards delivering services to poor farmers who are unable to privately source extension services. The participants sacrificed personal resources to deliver services to farmers to boost their farming activities. A participant who occasionally fueled their motorbike when visiting farmers, argued that most farmers lack the financial capacity to pay for private extension services.

Sometimes you are forced to use your own resources, because you must assist the farmers to come up; they have no alternative because you cannot tell them to pay. They are not able. (Robert-Ward Agricultural Officer)

The sense of satisfaction when farmers succeed in their farming endeavors was quoted as a source of motivation by some extension agents. An extension agent who was awarded for exemplary performance explained how her commitment to see farmers improve their livelihood drove her to work harder to deliver services to them.

I have the passion for this job. I do not work because I am paid. In fact, sometimes I do not sleep when I remember that I have work to do. I am impressed when I see a farmer coming from zero going up. It really touches my heart. (Evelyn-Ward Agricultural Officer)

5.2.1 **Extension is a sacrifice**

Participants reported to make 'different forms of sacrifice' to deliver services to farmers. For example, an extension agent who grappled with multiple project activities sacrificed family time and personal resources to deliver services to farmers to meet project demands. Another extension agent from a ward where the daytime temperature reaches 32^0c, regarded working under such conditions a sacrifice due to the hardships she endured to deliver services to farmers and to meet project demands.

Sometimes [KCEP] project needs report the other [project] wants something else… Farmers need my attention, and my family needs my attention too. Sometimes I sacrifice my money. I sacrifice more time. I cannot say that it is past 5 pm so I must go home. Sometimes I wake up at 4 am and do my reports or I sleep late drafting my report. I have to struggle and achieve. (Evelyn-Ward Agricultural Officer)

Sometimes it is difficult to work and especially during a time when it is hot like now. When I am going on foot, I get tired, the sun burns you… but because extension it is a sacrifice. I must keep going. (Gladys-Ward Agricultural Officer)

An extension agent who worked in his rural home tapped into his sense of care for his community by donating his own resource courtesy of a farmers' group that he started. The participant quoted being an extension agent as an honourable job:

Sometime back in 2013 I formed a farmer group about fruit tree production and when I go there, they remind me of my work. Most of the women are widows. Later the community wanted a place to store water and because their land parcels are small and I listened to what they were saying, and through a local leader I chipped in and offered 1/2-acre land where they built a big tank where they can store water. … being an extensionist is a noble thing. (David-Ward Agricultural Officer)

5.2.2 **Disregard titles and work and do everything**

Other interviewed extensionists disregarded their job descriptions to take up extra duties and to satisfy the needs of farmers. The following quotes are from two extensionists who served alone in their wards and who disregarded their job deployment to perform all the duties and responsibilities bestowed upon the office.

We have job descriptions, but we do everything that involves agriculture so whenever it comes to crops, agribusiness, nutrition… I am doing work on CA with FAO[20]. I have passion for supporting farmers….so I do everything to make [farmers] happy. (Evelyn-Ward Agricultural Officer)

You know what is happening around we are given [job] titles, but what we do every day is beyond our titles…. When it comes to seed distribution, we do it. We do not stick to what our titles say. We just work. (Musembi-Ward Land and Environment Officer)

Some extension agents demonstrated a sense of accountability by responding to farmers' demands, even those outside their deployment. A participant who was deployed as a soil and water conservation officer, took the responsibility of responding to most farmers' inquiries outside his job description to avoid turning them away.

I am everything because you cannot tell a farmer I am not responsible for this or that…so I do everything. (Musembi-Ward Land and Environment Officer)

[20] Food and Agriculture Organisation (FAO)

While some participants were driven by a sense of accountability and responsibility, others worked harder to legitimize their usefulness to farmers. An extension agent whose farmers seldom demanded extension services quoted to popularize his work through public forums to boost farmers' demand for his services.

> *… if you want farmers to realize that extension is relevant, it is our responsibility to let farmers know our relevance. (Shadrack-Ward Agricultural Officer)*

As mentioned, the extensionists were going through a transition from the national to the county government and they were grappling with the change. Some extension agents reflected with nostalgia at periods when a public extension officer was regarded highly by society and when they feel valued by government. Two extension agents who worked since the 1980s when the funding of public extension services was better, felt neglected and less cared for by the current county government as quoted:

> *In those (former) days extension services were better funded with [funds], transport and uniform, and [as extension agent] you would introduce yourself and you will be highly respected. (David-Ward Agricultural Officer)*

> *The (government) does not care for extension officers who are at the [field level] as it used to long time ago (before devolution). But if we can be taken care of as it used to be, and they [government] come to meet with us as they used to and love us as they used to, I am sure we will make it. But I do not know if they are aware that they are not loving us the way they used to. They used to impress us a lot until we feel warm. (Gladys-Ward Agricultural Officer)*

Extension agents felt the new county government took for granted their role. Some participants felt less cared for by the new county government. As quoted by a participant who I interviewed in her 'new' iron sheet office, such work environment devalued her status as a professional and public servant.

> *… when the county government came into play the county leadership was not kind to us. During the first term of county government we were not supported, we were even moved from our big office to this small room…. We had been promised a new office with electricity power, but do you know we were thrown outside even before we got*

this small space. (Gesturing at the room) Look at the way this office[21] *is. (Gladys-Ward Agricultural Officer)*

Interviewed extension agents reported feeling constantly obliged to legitimize their relevance to the county government as the leadership questioned the role of extension services.

These county governments came with a mentality that they do not know what we extension agents do; they think we have not been working…. some even ask why we are being paid. (Jacob-Ward Agricultural Officer)

Another participant felt the employer seldom rewarded extension agents for work done and for the sacrifices made towards supporting farmers like other organizations do. As quoted, the participant compared what other governmental and non-governmental organisations do.

…we also like to be motivated by the ministries, we wonder why teachers are taken for trips to Mombasa (beach), the NGO staff go for holiday, but our employer does not consider our motivation. (Evelyn-Ward Agricultural Officer)

Despite the challenges, extension agents most of them complained in silence. Two participants who neared retirement, chose to remain silent for fear of victimisation and feared risking their lives and the welfare of their families.

If you happen to want to ask more (question the system) then you are earmarked, then told your life is in danger. So, if you have a family like me, you just continue with your work and forget about it. (Musembi-Ward Agribusiness Officer)

As a person I said this is not my house and if I can render services from this [circular iron sheet office] then it is okay. After all, I will return to my own house. Because even if I complain about my office

[21] The ward agricultural office, where I interviewed the participants, was a small circular room approximately 3 meters in diameter, made of iron sheets and initially used as a store.

and I do not work, I will be the loser. I must work. (Gladys-Ward Agricultural Officer)

Other participants who feared being labeled 'non-performers' by management, catalyzed their endeavor to work harder to meet set work targets. Participants feared poor staff appraisal by the management and, therefore, made an effort to achieve work targets:

.. you must try your level best otherwise you will be labeled a non-performer. If you are not a performer you are out. You must plan and do all duties as expected by the Government, including programs. (Gladys-Ward Agricultural Officer)

And because I have to perform, I have to work hard and go to farmers. I must do everything to achieve my performance targets. (Alice-Ward Agribusiness Officer)

Despite the situations surrounding extension agents' work, most, of them took pride in their extension work to the community and viewed extension work as worthwhile. Extension agents also referred to their personal values and argued that earning a salary without working was tantamount to a lack of integrity.

We usually wake up and work; it is not good for you to get a salary and you do not work; your conscience will not be at peace. (Gladys-Ward Agricultural Officer)

With facilitation I have no excuse for staying in the office… I cannot sit in the office. I have to keep working. (Jacob-Ward Agricultural Officer)

5.3 **Summary**

Most interviewed extension agents expressed a commitment to continue supporting farmers, even when the environment felt uncertain and their sense of care and the commitment to see farmers succeed is reflected through the various strategies participants employ to meet farmers' needs. Extensionists' views about extension work, the farmers, and the Government, to a great extent, are reflected through what they do and how they do what they do. The next section further describes how extension agents glean solutions from multiple sources to address existing and novel farmers' needs. The section further describes how extension agents support farmers to

transition to new forms of livelihoods that potentially enhance their wellbeing and that are adaptable to changing ecological conditions.

5.4 How extension agents glean for solutions to advice farmers

What emerged from the study is that farmers demand both technical and non-technical services. The technical issues that extension agents tackled included crops and livestock production practices, pest and disease management, agribusiness, soil and water conservation and technology sourcing and application. Non-technical issues included conflict resolution, access to inputs, grant applications and farmer group registrations. Farmers seldom demanded information on weather and climate change, however, extension agents reported supplying advice on the subject whenever responding to farmers' other demands.

The first sub-section describes extension agents' experience with the transition from a supply to a demand-driven extension system. The rest of the section describes the approaches extension agents used to address the various needs of farmers and the strategies they employed to impart knowledge and skills to farmers.

5.4.1 Transitioning from supply to demand-driven extension systems

It has emerged from the study that extension service delivery is still transitioning from a period when services were supplied to farmers without them having to ask, to the current situation, where farmers are expected to ask (demand) for the services. An extension agent shared her experience of the supply extension approach (Training and Visit, T&V) and the reasons behind the transition:

> *In 1980s and 1990s we had the T&V approach… it was realized that we were taking information to farmers who do not want it. Farmers were feeling like we are disturbing them…. some would run and hide from us… that is when the demand-driven approach was introduced whereby farmers were supposed to seek and ask for services so that we may be able to address their issues. (Alice-Ward Agribusiness Officer)*

Farmers adjusted gradually to demanding services, but some still expected to be 'supplied' with services, and extension agents proactively reminded them of the change. Extension agents reported responding to farmers' demands by providing advice in person or by mobile phone.

Some farmers are aware of how we work now so they demand for service. Some call me, some come to the office, and we book an appointment. I am seeing it work now. (Emma-Ward Agricultural Officer)

While extension agents acknowledged that extension services are demand-driven, the majority interviewed still supply services to farmers, either through projects or on routine field visits. According to an extension agent who works with older farmers, most are unable to source solutions to their farming challenges on their own even when they need help. Such circumstances forced him to 'supply' them with information and technologies. As quoted by the participant, the decision on how to deliver extension services to farmers required a consideration of those who can access information on their own and those who needed help.

...It is not that the farmers do not need the services, but they cannot access them. Do not forget that most of our farmers are illiterate, they need somebody to show them the way, to guide them... we have information on mobile phones and phone applications such as the I-cow[22] but how many farmers will access that information? Very few. So, if we do not handle extension services properly some farmers will suffer. (Robert-Ward Agribusiness Officer)

As a consequence of the current situation, in their day-to-day extension activities, extension agents blended the two approaches to meet the needs of farmers.

5.4.2 **Advise, influence, inform, educate, motivate, encourage**

Extension agents reported that they provided technical support to farmers to improve crops and livestock productivity. Participants reported tapping into their technical knowledge and experience accumulated over their years of service to advise farmers on the selection and management of farming enterprises as well as marketing. The following quote describes how extension agents used their technical knowledge about

[22] I-Cow is an SMS and voice-based mobile phone application that is designed for smallholder farmers in Kenya to access information to improve their livestock practices and production. Farmers get tips on breeding, nutrition, and milk production. Source: https://icow.co.ke/

climate change to advise farmers on the choice of crops to grow and ways to improve the productivity of their crops and livestock.

> *I am the Ward Agricultural Extension Officer. Majorly I concentrate on shaping how farmers do their farming so that they achieve more in the continually changing weather conditions including the climate change. My extension messages dwell on how to prepare their lands, selections of the best varieties to plant…. that suit their environment and ecological condition. (Abel – Ward Agricultura Officer)*

However, differences in the demands of farmers in hilly areas and those in semi-arid parts of the county emerged from the study. Farmers in hilly areas were reported to be growing high-value crops for export, therefore, extension agents tailored their information about crop management skills to help these farmers meet the demanded market standards.

> *We provide technical services to farmers on crop protection…. Especially those who plant vegetables for export, such as French beans…Since the (GAP) standards are demanded by European countries, we must advise [farmers] on the safe use of pesticides, minimum residue on crops and other practices so that they can meet the standards set. (Ndolo – Ward Agricultural Officer)*

Participants from the semi-arid areas that have rivers, equipped farmers with skills to irrigate crops to earn income to meet household needs. A participant recounts equipping farmers with technical skills and knowledge to produce vegetables for sale. Other extension agents noted that vegetable production was a dependable source of livelihood for families living along the rivers and an alternative to rain-fed farming.

> *[when you called]...I was meeting farmers doing irrigation along the Athi river, to advise them on horticultural production, type of seeds, pest and disease control and even link them with the market. (Masaku – Ward Agricultura Officer)*

> *We advised farmers to plant onions, Sukuma wiki [kales], capsicum and hot pepper along river Athi and Thwake. So, people now use that water to irrigate and crops as a way of surviving. (Shadrack – Ward Agricultural Officer)*

Extension agents deployed as agribusiness officers reported supporting her farmers through training to change from farming for food only to farming for income as well. She reported to continuously motivate her farmers as they gradually transitioned to farming business.

> *My current deployment is agribusiness …my role is to help farmers to change from subsistence farming by promoting commercial farming. My role is to train and motivate farmers to see farming as an enterprise that they can invest in and to select enterprises that will give them food and an income. (Alice – Ward Agricultura Officer)*

Extension agents reported farmers to be demanding help on managing existing and new pests and diseases. How extensionists dealt with existing challenges differed from how they managed novel challenges beyond their technical know-how. The following section discusses how extension agents tackled existing and emerging crop and livestock pests and diseases reported by farmers.

5.4.3 **Addressing existing and novel pests and diseases**

The data showed that extension agents dealt differently with existing and novel pests and diseases, however, in both cases, farmers reported incidents while extension agents gleaned for solutions. The process for providing advice was described by an interviewee:

> *Our areas of intervention have been on areas where farmers require information, for example, about pest infestation. If a farmer calls and explains well the kind of infestation, we sometimes can identify from his information what kind of pest it is. But there are those farmers who come to the office looking for advice. So, we use their information to verify the kind of pest…if it is not possible (to verify), we visit the farm, establish what kind of pest, and then give appropriate intervention. So, we verify first and advise accordingly.* (*Jacob-Ward Agricultural Officer*)

As described in the quote, extension agents collaborated with farmers in gathering and exchanging information vital for the identification and control of existing pests and diseases. Extension officers utilised their technical knowledge to recommend a range of solutions to farmers, who implemented, then gave feedback to the staff. While sometimes extension officers advised farmers over the phone, other cases required a visit to the farm. Cases of novel pests and diseases required the physical presence of

extension agents to ascertain the nature of the problem. As reported in the following quote, some extension agents visited farmers to fulfil the demands and preferences of farmers and to satisfy farmers' demands.

> *We [extension agents] have noticed that when a farmer calls it is not possible to advise them to a level where they are satisfied. (Shadrack-Ward Agricultural Officer)*

> *Sometimes a farmer can call you over the phone and you solve the problem over the phone. There are things to respond to on the phone, others you need to be there physically, like new pests. (Josephat-Ward Agricultural Officer)*

5.4.4 **Addressing novel pests and diseases**

The report shows that farmers asked for help with pests and diseases affecting crops that they deemed new to them, such as army worm and *Tuta Absoluta*[23]. Extension agents reported responding by recommending a range of control measures to farmers. However, as quoted below by an extension agent whose farmers reported an incident of an unfamiliar pest affecting their tomatoes, his recommendation did not work.

> *We have a pest called fall army worm. This was noted recently, and it had done a lot of damage and we could not understand because we were confusing it with the normal bollworms. Little did we know it was a new pest in tomatoes called Tuta Absoluta (Nzangau-Ward Agricultural Officer)*

In circumstances where technical recommendations by extension agents could not solve the problem, most participants reported gleaning information from multiple sources to solve emerging pest and disease problems. Some participants reported seeking help from fellow extension staff via the office WhatsApp group platform, where staff exchanged information.

> *Of late we are using WhatsApp and emails for emerging issues…. if there is something urgent like we had locusts, I informed my supervisor in the county office…. we even shared with the extension*

[23] *Tuta Absoluta* is a novel tomato pest that farmers reported to extensionists

officers and neighbouring wards to get everyone's (extension staff) attention. (David-Ward Agricultural Officer)

One extension agent relied heavily on local scientists working in crop research organisations for advice. Another extension agent gathered information from research projects they participated in, which they then relayed back to farmers. As described in the following quotes, extension agents gleaned solutions for novel farming problems from their networks, which they relayed back to farmers.

So, we must depend on researchers for advice. Whatever they [information] get passed to us, and we pass to farmers too. If they have nothing, then we have nothing to tell farmers. (Nzangau- Ward Agricultural Officer)

International Centre for Insect Physiology and Ecology (ICIPE) is running a project on the relationship between climate change and the escalation of pests and disease. We were involved and we learned that we have a new pest in mangoes called fruit fly and its control measure. The fruit fly trap. Which we now advice farmers to use. (David-Ward Agricultural Officer)

Gleaning for information and solutions to support farmers also involved indirectly drawing on new technologies from projects driven by NGOs. One example of this was the mango value chain platform created by an NGO which brought together agencies to find solutions to the mango fruit fly pest. Field extension agents were not members of the platform, however, some of them mentioned the mango fruit trap technology in their interview. It was established that ward extensionists were trained by an extensionist from a local NGO that partnered with an international research organization working on the mango fruit fly. A participant, whose organisation participated in the mango technical platform, trained field extension officers on the new technology and commissioned them to disseminate it to farmers to enable them to tackle mango fruit fly and improve their fruit quality.

We [NGO2] first make calls and ask for all the field extension staff who have not been trained on fruit fly…. Sometimes we get up to 30 extension staff to train. In that training we invite ICIPE ... We are training as partners so all of us must be there. If we want them [extension agents] to help us in disseminating information or technology like the project on fruit fly, once we train them, we tell

> *them to pass the information to farmers. Wherever extension officers go for extension activities I might not be there, but they will meet and pass the information to farmers. (Project office-NGO2)*

Concisely, as reported, an extension agent valued networking with agencies with similar goals to draw on solutions to address farming challenges and to enhance farmers' wellbeing and livelihood.

> *You must rely so much on one another to come up with solutions. In the event of climate change as a team (extension agents and collaborating agencies) we have realised that there is a need to work together and promote practices and technologies that fit the changing climate. Remember most of these organizations are talking about improved yields and incomes. (*David-Ward Agricultural Officer*)*

Another extension agent learned from his farmers how they controlled mango scales with household detergent after their prescriptions failed to work.

> *…farmers have come up with ways of controlling a mango pest known as scales. You know Ariel soap; they get one drum of water (100 litres) and mix with one kilo of the soap and then sprayed their trees. The tree looked like it has been washed. This was done through trial and error …the farmer had used a lot of money but since the synthetic pesticides failed, farmers tried other local ways and it worked. The mixture solved the problem. The scales were all wiped. (Josephat-Ward Agricultural Officer)*

As frequently mentioned earlier, extension agents regularly advised farmers on new forms of livelihood that matched the changing ecological, technological, and social situations such as pasture production and goat-keeping. However, as described in the following sub-section, the extension agents' drive to introduce new forms of livelihood was met with resistance, especially by the older farmers. In summary, extension agents used strategies such as demonstrations and dialogue with farmers to persuade them to gradually change practice. Crop failure due to prolonged drought was reported to also push farmers to change and adopt livelihoods resilient to the erratic weather.

5.4.5 From grass to grace: A success story of a farmer's change from growing crops to growing grass pastures

> *Last year there was a farmer in Kikumbulyu south who changed his [farming] activities, he moved from growing crops to pasture grasses, and trees. When I visited the farm, his stalls were full of grass…I could see people [buyers] ferrying the grass to all over the county. He was also contracted to produce the grass seeds by a certain organization. When I talked to him, I found out that he had moved from his original (grass-thatched) house which he used to stay when he was growing crops and built a modern house out of the proceeds from the grass sales. He said he cannot demolish his old house since it is a testimony to where he has come from. That is why I am telling farmers there is a future in pasture production. (Joshua- Ward Agricultural Officer)*

Pasture production is an example that illustrates how extension agents influence farmers to transition from long-established practices to new farming practices that better fit the changing ecological conditions.

Participants from the arid and semi-arid wards introduced pasture production to complement open-field grazing as a way of improving livestock productivity in the area. A livestock extension agent remarked that owing to the changing climate, pasture production potentially determined the future of livestock production.

> *We are also encouraging [farmers] to go for other activities such as growing grass since it is resilient. If [farmers] establish pasture with little rain the grass will generate fast... and those (farmers) who have tried have said there is money. Even if they are not using it to feed their animals, they can sell it. It has not been there but now it is turning up to be a better option. (Mwatu – Ward livestock Officer)*

However, extension agents tussled with farmers over keeping high numbers of livestock and pushed them to reduce their stock numbers due to scarcity of pasture. Older farmers were characterized as being difficult to persuade to accept change as they preferred traditional practices such as open-field grazing over growing and stocking pastures on their farms. Extension agents used the example of farmers succeeding from growing pastures alongside food crops to convince for change and accept the new practice.

Agriculture is driven by old people, above 50% of them are the people involved in agriculture. But they are difficult to change. So, we are convincing them that they can grow both crops and pastures like lucerne. (Mwatu – Ward livestock Officer)

Livestock extension agents expressed a sense of hope about sustaining livestock production as a source of livelihood, but only if farmers implemented their technical advice. Extension agents convinced farmers to grow pastures to supplement open grazing and equipped them with the necessary skills and knowledge. As indicated in the following quotes, some farmers were reluctant to implement the advice, but the failure of crops compelled them to change and to embrace the production of pasture.

The change is slow, ….it is because the majority of the farmers that I have trained had not adopted that concept of planting pastures, managing, and conserving. But nowadays they [farmers] are seeing the sense since when the crops failed, they get something from the pastures…then they sell. (Mwatu – Ward livestock Officer)

Extension agents matched their pasture production drive with a Government flagship project which provided free artificial insemination services to encourage farmers to grow pasture to sustain the productivity of the improved breeds. Participants promoted pasture production alongside dairy production to boost its uptake.

The county has a program of providing AI services at subsidized cost of KSH. 300. What we are doing is to encourage farmers to upgrade their animals and then plant more pasture so that their animals can produce something [milk]. (Mwatu – Ward livestock Officer)

A participant compared between income from dairy and beef production to enlighten farmers on the value of each of the choices. The following quote by a livestock extension agent aimed at enabling farmers make a choice between investing in a large stock of beef cattle or in dairy production. Extension agents used the business idea to motivate farmers to see the value of the change in livelihood choices.

… we help [farmers] compare those who have beef cattle and those who have dairy cattle. For example, in the morning the farmers who have dairy cattle gets something [milk], but the beef farmer must wait until the maturity of that animal so that it can be disposed to get

money. Through such advice farmers can see the sense and and make a choice. (Mwatu – Ward livestock Officer)

5.4.6 **Conclusion**

Extension agents still grappled with transitioning farmers from supply to demand-driven extension services. However, extension agents blend the two approaches to meet the needs of farmers who demand services and those who do not. Farmers lean on extension agents for solutions to both existing and emerging challenges. Extension agents glean solutions from their networks to address challenges reported by farmers. Farmers have been depicted as slow to accept new forms of livelihoods which are deemed adaptable to the current economic and ecological situations. Interviewed extension agents leveraged on the success of some farmers to encourage other farmers to consider adopting alternative livelihoods.

The following section presents the results of how extension agents navigate through the role of disseminating diverse types of technology to farmers. The technologies discussed in this section are introduced to farmers by external agencies such as projects, NGOs, and research organisations. The section draws on earlier reporting about the extension agents' sense of responsibility which drives their commitment to ensure farmers benefit from the technologies introduced.

5.5 **How extension agents navigate through the role of technology transfer**

5.5.1 **Introduction**

Supporting farmers to adopt technology is one of the most important roles of extension agents. As outlined in this section, the technologies mentioned by participants differed in their novelty and the nature of action needed to drive the adoption process. While new technologies required adjustments to fit the 'ground situations,' reintroducing old, but improved technologies, required dialogue. However, across the range of technologies, extension agents applied similar strategies to convince and boost farmers to adopt the technologies. The following technologies were commonly mentioned by participants; farm pond, conservation agriculture (CA), Zai pits, sorghum, and soil and water conservation technologies (cut-off drains, retention ditches, and terraces). Based on the extension agents' views, the technologies can be classified into four types. Each technology type has a set of actions which extension agents use in their pursuit to support farmers either to adopt or abandon the technology.

Table 8: Summary of type of technologies

Type of technology	Example of a technology
New technologies	The Farm Pond technology
New technologies replacing existing but unsuitable technologies	Zai pits vs Trapezoidal structures Retention ditches vs cut off drainage
Old technologies that need re-adoption	Sorghum crop
Existing long-term that needs abandoning and replacing	Maize Cut-off drainage

In the order listed in

Table 8, the following sub-sections discuss each type of technology and the complexities that characterize how extension agents disseminate and support farmers through the adoption journey. For example, it was evident that while some technologies are accepted by farmers, others face resistance. Extension agents use various strategies to build farmers' confidence in new technologies and support the process of behavioral and/or mind set change. The section further describes the strategies extension agents use to build the confidence of farmers to transition from old to new practices. Existing and emerging 'ground situations[24]' have emerged as impacting how extension agents support farmers to adopt technologies.

5.5.2 New technology: The farm pond technology

The farm pond was the most-mentioned water harvesting technology across the various ecological zones. The pioneer and promoter of the technology is a bishop from the neighboring semi-arid Machakos County who trains local farmers on how to harvest

[24] The term is a slang that locals use to refer to the differences between the ideal world as described by outsiders and the real world as they experience it. Extension agents used the term when referring to the difference between conditions under which technologies are developed and those experienced by farmers as they implement the technologies.

and store water in farm ponds. According to extension agents, the Makueni governor liked the technology due to its potential to boost local community's food security and thus end the long reliance on '*mwolyo*' (relief food) from the national government and donor agencies. According to interviewees, the governor sponsored all field extension staff and some farmers to tour the bishop's farm to learn and promote the technology. Two extension agents who participated in the trip recounts the idea behind it:

> *Our governor liked the technology and therefore he ensured that all of us as in all extension officers were taken to Yatta to see the [farm ponds]. And that is why we are promoting it now. (Mutembei – Ward Agricultural Officer)*

> *Most of our staff and our farmers were taken there (Bishop's farm) to see because seeing is believing and therefore when we come back home, we were expected to implement. The technology blended well with the governor's initiative "operation mwolyo out" which aims at eliminating the culture of dependency on relief food. (David-Ward Agricultural Officer)*

To support farmers to adopt the farm pond, extension agents provided technical support such as positioning, designing, and overseeing the construction farm ponds and the laying of the dam liner. Farmers bore the cost of excavation and purchase of the dam liner as well as the management of the pond.

Although the technology was a success at Bishop Masika's farm, extension agents realized that implementing the technology as demonstrated at his farm was not possible for other farmers. They realized that the soil at the Bishop's farm had a higher water-holding capacity compared to the sandy soils in the semi-arid areas that cannot retain water for long. The ponds also lost a lot of water through evaporation due to the high temperatures recorded in the area where they work. As a result, extension agents adapted the farm pond technology to the local conditions. The extension agent recounted that their advice to farmers was to use dam liners and shade nets to reduce water percolation and evaporation.

> *Our soil is not like the one at Bishop Masika's farm. When we excavate our ponds, it only holds the water for two weeks then the water percolates. Because of that if a farmer wants to do farm ponds, they call us then we tell them if their type of soil needs a dam liner or not. (Mwololo-Ward Agricultural Officer)*

Extension agents realized that dam liner materials were not locally available and therefore farmers could not access them. Extension agents took the responsibility of sourcing information on where to buy dam liners and connected farmers to the liner stockist and help them to lay it on the pond:

> *I have been advising them (farmers] on the layout of the water structures that is using dam liners … and organise to buy from Nairobi. Then once they buy it, I help them to lay out the liner. (Mutembei – Ward Agricultural Officer)*

Extension agents reported that farmers are enthusiastic about the farm pond technology, however, the cost of the technology was higher than most farmers could afford. An extension agent who works in a ward where 65% of the population is poor, explained why the technology is not accessible by poor farmers.

> *A good farm pond excavation will take 8 hours to excavate at the rate of Ksh. 4000/hour which makes a total of Ksh 36000. And if your soil is poor then you buy a lining which will cost you up to Ksh. 100,000. So, the total is Ksh.140,000 (~USD 1500) and on top of that a farmer will need a water pump, drip lines and a tank...but in my ward the poverty index in my ward is 65%…This technology is not for the poor but for the rich farmers. (Interviewee RA120)*

Extension agents particularly identified the cost of hiring a buckle excavator and the cost of a dam liner as the main factor constraining farmers' efforts to implement the technology. Because of the high cost of constructing the ponds the adoption of technology was reported to be low, especially in areas with high poverty levels.

> *The farm ponds…farmers as we talk want it, but they are only limited by finances and therefore cannot afford it. (Mutembei – Ward Agricultural Officer)*

Extension agents working in the semi-arid areas stated that they believe in the potential of farm ponds to improve livelihoods of their farmer. They reported using various strategies to enhance the ability of their farmers to adopt the farm technology.

First, extension agents explained that they drew on the county government's financial resources. The county government offered two forms of resources to farmers: the *Tetheka* (Help) Fund and a backhoe tractor for excavating farm ponds. An extension agent who was privy to the undertakings of the government, described the *Tetheka*

Fund as an open fund that community members can apply to implement any profitable activity. The fund is competitive as quoted by the participant:

> *Tetheka fund is an amorphous fund, the county government set aside to respond to our [community] needs. So, farmers have an opportunity to apply for the loan to implement a project of their choice and then pay later. (Nzangau – Ward Agricultura Officer)*

To boost the effort of farmers who were interested in the technology, yet lacked the necessary finances, extension agents shared how they mobilized and supported farmers to apply for funds.

> *We (extension agents) are promoting farm ponds by helping farmers access the support of the county government for interest free [Tetheka Fund] …. We are mobilizing farmers to borrow to pay for tractor services and buy pond liners, drip irrigation and vegetable seeds. (Mwololo – Ward Agricultural Officer)*

While most extension agents saw the fund's potential to boost farmers' adoption of the farm pond technology, they viewed the application process as too complex for most farmers. Extension agents worked with farmers throughout the application process in an attempt, to boost farmers' chances of qualifying for the loan. An extension agent explained how she assisted farmers to access the Tetheka Fund.

> *We have the Tetheka fund which farmers are applying for through our office. After excavating the pond, we direct farmers to go and download the fund application form from the county government website then we help them fill it in. We do a budget with them on how to service the loan and we ensure they have a sound plan. Then the farmers take the form to the village administrator then to the ward administrator and finally to the sub-county administrator for signing. (Jackline-Ward Agricultural Officer)*

Extension agents also endorse farmers' applications by making a recommendation to the grant approval committee if their business plans are sound and attainable. Extension agents reported using the power allocated to them to approve farmers' applications for funding. If a farmers' application was successful, the extension agents further supported the farmer to construct the ponds and place the liner correctly, as noted.

…. We also have another form from our Ministry [of Agriculture] that we sign and give recommendations about the farmer's application. Then the farmer attaches that form to his/her application form before sending it to the Ministry headquarters to make its final decision. If we have recommended that the reason for the loan application is achievable, [County-Agriculture office] endorse the application and forward it to the Kenya Commercial Bank since it is the one managing the fund who later dispatches the loan to the farmer. The farmer then buys the liner then we go and help them to align it in the pond since the process is technical. (Mutembei-Ward Agricultura Officer)

Besides supporting farmers to apply for the Tetheka Fund, extension agents shared how they team up with farmers to push the county government to support farmers with particularly expensive machinery such as soil rippers and tractors. According to participants, at the onset of the farm pond project, the county government did not have any machinery to excavate ponds. Farmers relied on private road excavation machinery operators who are expensive to hire and often unavailable. Extension agents working in the wards where demand for farm ponds was high, appreciated how farmers struggled to access the private machinery. Extension agents decided to look for solutions from the government and NGOs. However, extension agents encountered institutional directions such as the policy on public planning and budgeting which challenged their efforts to channel farmer's needs.

According to the extension agents, the farm pond project occurred when the current devolved system of governance system was in effect. Unlike the former centralised government system, where public participation in the budgeting process was not common, the new devolved system aims to enhance the participation of the local community. According to the policy, public servants can attend the local public participation forums, but cannot influence the proceedings. One extension agent who participated in numerous forums reported to only sit and watch as the locals debated about their priority development projects.

Owing to such institutional directions as public servants, extension agents cannot directly push for budgeting of resources that farmers need. An extension agent shared how they circumvented the policy directions and indirectly lobbied through some community members to push for a budget for farm machinery for farmers. One extension agent explained how she used public participation forums to encourage the community to channel their demands for a pond excavator from the government.

We as staff we [cannot directly ask for what we want for farmers], it must come from 'mwanainchi mwenyewe" (the citizens themselves) but not staff. So, we are only opening their (farmers) eyes, we are sensitizing them and if they see the need, they priorities that in the budget. (Lydia– Ward Agricultura Officer)

According to an extension agent who attends these fora, the community members seldom ask for agricultural related projects. Extension agents coached farmers on what to ask for in public participation forums at the village and ward levels. As reported by extension agents, because of the effort to coach and lobby for machinery, the county government managed to obtain only one buckle tractor which is shared by farmers in 30 wards.

My aggressiveness as an extension staff has seen me lobby for funds for [an excavator] the ponds from the county through the public participation forums. Farmers were not keen on asking for projects on agriculture and food security, but I was able to lobby and push them to ask for funds to support the farm pond project. Otherwise, if I do not do that agriculture will not be funded at all. (Mutembei – Ward Agricultural Officer)

However, an effort by other extension agents to lobby for more machinery was not successful due to lower allocation of funds from Government. As explained in the following quotes, sometimes the communities' choice of projects did not match with the agendas of their political leaders and, therefore, the budgets were reduced, or the projects changed.

Last year I tried to mobilise the community through public participation, they proposed we buy a backhoe excavator. But the funding which we were given was less. We were given Ksh. 9m and that cannot buy a machine, so the budget was later changed to something else. (Shadrack-Ward Agricultural Officer)

.. you find that projects are suggested at the grassroot level but when they reach the county assembly these projects are not important on their (county) level…so we try to propose things, but they do not materialize, or they do not reach the end (they do not feature in the final county budget), so we just try our level best. Like for example in 2015/2016 the farmers wanted a tractor and they got rippers and hay

baler… at the county level they said there is no money for tractors, so they brought different things from what farmers asked. So, you find it is a problem… [farmers] are sometimes not given what they want.
(Oscar-Ward Agricultural Officer)

Extension agents supported farmers to access the shared backhoe excavator, by making a booking with the Agricultural and Mechanisation Centre on behalf of farmers. As the demand for the machinery is high, farmers were reported to be waiting a long time to access its services. For instance, an extension officer who made a booking for farmers shared his frustrations of waiting for the machine for a long time, even though it was working in the neighboring ward. In this case, the extension agent shared how she circumnavigated the booking process by directly negotiating with the staff in that neighboring ward to allow the tractor operator to excavate his farmers' ponds too.

The [Ministry of Agriculture] has been helping farmers to excavate those farm ponds. But the challenge is that there is only one machine so farmers must wait for a long time. But there was a time when the tractor was in the next ward and I agreed with the staff and the machine driver to extend his work and excavate for my farmers.
(Mwololo – Ward Agricultura Officer)

Extension agents indicated an appreciation for how the Tetheka fund, and the buckle excavator services, had boosted the adoption of the farm pond technology in the county, but noted that only a relatively small percentage of farmers had accessed the technology. As mentioned earlier, farm ponds are costly to construct, and it was explained that farmers who have an interest in the technology, but lack the funds, seldom get to adopt it.

5.5.2.1 Change your mind-set, manually excavate the farm pond then 'I will get you a dam liner"

An extension agent working in the ward regarded as the driest, shared that farmer have not adopted farm pond technology because they lack commitment to do the work. He acknowledged poverty as an obstacle to implementing the farm pond technology as mentioned by other extension agents, however, he partially blames the mindset of farmers. According to the extension agent, farmers in that part of the ward had relied on 'm*wolyo*' (relief food) for many years and, as a result, that belief has become a way of life for the community. However, through a story, he shares how he is challenging farmers to manually dig their farm pond and how he reciprocates their efforts by sourcing free dam liners for them from collaborating agencies.

I want to tell you about an experiment I did with a farmer who has never been employed by anyone, he was not wealthy…so he was just surviving. I told him that there is a NGO program supporting farmers with dam liners, so I asked him can you dig a farm pond? I told him, "Try and dig the farm pond and it will save you for the better part of your life and your children will never go hungry." He listened and started digging together with his wife. The two of them dug the pond for 70 days (about 2 and a half months) measuring 12m by 3m deep. I told him to dig deeper up to 4 meters. Last year from the water he has harvested, they irrigated mangoes and for the first time he sold one pick-up truck full of mangoes. He came here and invited me to go and pick mangoes from his farm. So, it is not right to say people are poor and they cannot dig… the cost is high, but from what I told a farmer and he did it, is not expensive. What is missing is the commitment. (Shadrack-Ward Agricultural Officer)

The extension agent used the success stories of farmers who have manually dug their ponds and who are using the water harvested to improve their livelihoods to encourage other low-income farmers to adopt the technology. According to the extension agent, through his relationships and networks, he applied for dam liners from a consortium of which World Vision was a member, to support a vulnerable youth group who had manually dug their farm ponds.

Those [farmers] who have bought the [farm pond] idea, what I normally do is to support them like if I get an NGO offering the liner, I tell them dig the farm pond and then ask me for help. I will go and look for the liner as you dig. Last week we gave three youth groups three dam liners courtesy of the World Vision through the Dry Development (DRYDEV) consortium. When DRYDEV was winding up, World Vision had promised to give three dam liners, I called the youth group and asked if they had finished digging up the farm ponds. They said they were ready and the following day the dam liners were dropped at the sites. So, if they had not excavated their ponds those liners would have benefited farmers from other areas. (Shadrack-Ward Agricultural Officer)

Another strategy that the same extension agent uses was to indirectly influence NGOs to support farmers with dam liners. The extension agent shared a story of how he

would get his farmers to manually excavate the ponds and then send photos of their progress to the NGO's staff. The photos were proof of work-in-progress and, therefore, such a farmer stands a greater chance of getting support from the NGO whenever an opportunity arose.

> *There is a young lady whom I found waiting for relief food and I reminded how other ladies are making money from the sale of coriander. She later attended our training and she approached me and told me that she is willing to dig a pond. So, she asked me to go and measure the farm pond for her…. Recently she sent me a photo saying, "farm pond in progress." I told her to send the photo to World Vision staff so that when funds are available, she can get a liner. …she has the will so we will support her…she won't have to sit here and wait for 2kgs of relief food for a full day". (Shadrack-Ward Agricultural Officer).*

The NGO's programme manager reported having a good personal and working relationship with the local extension agent as they regularly supported each other. Another strategy used by an extension agent working in a hilly area, whose farmers were reluctant to adopt the technology, shared how she organised a farmer's trip to a ward with similar terrain and where farmers have farm ponds. According to her, such trips challenge farmers' mindsets and motivate them to act.

> *We are promoting farm ponds, though the uptake is not as fast as farmers are still learning [about the technology). The KCEP-CRAL[25] program sponsored an exchange tour to other wards which were piloting the project. We took them to Kisau/Kiteta were they have farm ponds, so they were exposed to what farmers in dry lands are doing. Because of that trip I can say the trend in my ward is changing, we now have farmers in my ward who have farm ponds. (Lydia-Ward Agricultural Officer)*

In the case of farmers who cannot implement the farm pond technology due to lack of funds, extension agents recommended cheaper, alternative, water-harvesting

[25] Kenya Cereal Enhancement Project-Community Resilience Agricultural Livelihood

technologies such as farm terraces as they can hold water. According to extension agents, graded terraces is not a new technology, but an old technology that is still effective as a soil and water conservation measure. As quoted, some extension agents recommended terraces, while others recommended household roof catchments.

> *You know the cost implication is high [for farm ponds]. But somehow, farmers are surviving…. That is why every farm in my ward has terraces. The structures hold water and soil too. So, I tell [farmers] to dig them. (Jacob-Ward Agricultural Officer).*

> *…. but we are trying to encourage those who cannot afford the ponds to harvest water flowing on the roads and to divert it to their farm as much as possible. And to do roof catchment[26], at least to harvest and make use of every drop that we have. (Lydia – Ward Agricultura Officer)*

One extension agent reported how farmers influenced each other to implement cheaper but effective water harvesting technologies in his ward. He explained how one farmer was influenced by the performance of his neighbours' crops which grew on a terraced farm.

> *One of the farmers that I assisted in designing and digging up the terraces is now marketing pigeon peas while others [farmers] have nothing. His crop has performed very well… and the other day I found a neighbouring farmer digging terraces. The farmer told me that he has been motivated by the neighbour's crop performance. He was therefore copying the successful water harvesting structures (terraces). This means that if some farmers are successful others can copy the technology from them. (Musembi-Ward Agricultural Officer).*

5.5.3 **Summary**

The section presented how extension agents support farmers to adopt a new technology which they believe is beneficial. Extension agents demonstrated how they tapped into their technical knowhow to fit a 'borrowed' technology to the local conditions. Interviewed extension agents demonstrated how they work with the system,

[26] The participants refers to harvesting rainwater from the roofs

and outside of the system, to access resources for farmers. Some coached farmers and lobbied through farmers participating in public participation for the county government to buy a farm pond excavation machinery. Extension agents further complemented farmers' effort to own a farm pond through accessing source information on where to purchase inputs and helping them lay down the liners. They guided, approved, and recommended farmers to access a competitive funding opportunity to boost their efforts to access the technology. Some extension agents circumvented the machinery booking system to expedite the farmers' access to the machinery. Extension agents working in wards with NGOs, mobilised resources from these agencies to complement the farmers' effort to manually excavate their ponds. They further used success stories by farmers to change the mindset of other farmers and influence them to take a step towards adopting the technology. Extension agents used farmers to influence others to take up the technology. For the farmers who were unable to implement the technology, extension agents gave them cheaper, but effective water technologies.

In the next section, the researcher uses Conservation Agriculture (CA) technology to describe how extension agents support farmers to transition from old to new technologies which require a shift from previously learned practices. This will tell us more about how extension agents do their jobs.

5.6 New and adapted technologies

Conservation agriculture is among the technologies promoted under climate-smart agriculture practices. As explained by participants, conservation agriculture involves three practices; minimum tillage, the use of cover crops, and crop rotation, which farmers can adopt in phases. A program manager from the organization championing CA alongside local extension agents explained the nature of the CA technology:

> *The aim of CA is to fix the natural resource base through practicing minimum tillage and the use of the right equipment, soil cover and crop rotation…but through my experience it is not a requirement for farmers to apply the three practices to be considered to have adopted CA. (Program Officer-Development Organisation 1)*

Participants applauded the CA technology for its positive impact on agricultural productivity, especially in wards where climate change continues to negatively affect crop production. As quoted by an extension agent working in a ward that experienced harsh weather conditions, and regarded CA as a means to revive agriculture:

The population of these counties is close to a million…70% of them rely on agriculture as a source of livelihood. But look at the environment, it has deteriorated, the weather pattern has changed so much that if we (extension agents) do not change how we recommend farmers to manage their land resources then, ultimately, we know they do not stand a chance to harvest. So, we have introduced CA here since climate change is real and we must fix it now. (Mutembei-Ward Agricultural Officer).

Even though the CA technology is lauded by participants significant in addressing the challenge of climate change, the dissemination of practices underpinning the technology was an uphill task for extension agents. Some of the CA practices are new and others are improvements on past agronomic techniques in which extension agents have trained farmers. For instance, the use of cover crops to reduce soil moisture loss and use of herbicides to eliminate weeds, are well-established practices. However, other CA practices mark a complete change from what extension agents have recommended to farmers in the past. For example, extension agents explained that before the introduction of CA, they trained and encouraged farmers to practice double digging[27]. Now, extension agents recommend minimum tillage which discourages the ploughing of land and turning of soil and encourages farmers to only open soil along the planting rows.

In regard to the CA recommendations, farmers were reported to resist changing practices, especially those earlier trained on double-digging. An extension agent promoting CA technology whose farmers resisted the recommendation to practice minimum tillage states:

Uptake is still low because farmers still believe that you must cultivate the whole farm. Even if you tell an older farmer to cultivate only where he is planting, he asks, "how will my farm look with some areas cultivated and others not?" (Josephat – Ward Agricultural Officer)

[27] Double-digging is a practice that involves digging and removing the topsoil layer, exposing the hardpan beneath, breaking it up, adding organic matter, and replacing the topsoil which was initially removed.

An extension agent whose farmers resisted the change, quoted how some questioned his technical capabilities when he introduced the new CA practices:

> *Farmers have negative perceptions towards these technologies (CA) such that if you tell them not to overturn the soil that is zero tillage, they look at you like a stranger. One farmer asked me 'is it not you who told us to overturn the soil for aeration to take place. Now you have come here with a different theory that we should not overturn the soil. So, whom shall we listen to?' (Josephat-Ward Agricultural Officer)*

The extension agent partially blamed his farmers' resistance to the existing culture of ploughing land by use of oxen in which men take pride. However, another extension agent experiencing the same resistance partially blamed it on the changing status of farmers. According to him, unlike in the past when most farmers were illiterate and could not source information independently, currently, some farmers are informed and therefore question recommendations from a point of knowing.

> *I remember 30 years ago we were spoon-feeding farmers and there was minimal involvement and contribution in terms of ideas [from farmers] … But today the farmer is highly proactive…they are contributing even in terms of ideas. Some are retired senior officers who are informed, others are youth who can google for information…. they challenge you. (David-Ward Agricultural Officer)*

To motivate farmers to change from the old ploughing practices to the new CA practices extension agents reported demonstrating the new practices and then allowing farmers to see and make a choice. As quoted by an extension agent, farmers are more likely to adopt a technology if they see the technology working, but he also highlighted the need to illustrate their technical ability to farmers:

> *You must convince the farmers by demonstrating that you know. Most farmers believe in results. You convince them by setting a demonstration with CA technology and another control plot without any CA technology. Then let the farmer see which plot has done better. Once he sees the difference you can ask him to decide on which technology is better. The results they will see will help you to convert the farmer, even the very conservative [farmers] who rarely change.* (Josephat-Ward Agricultural Officer)

In addition to using their technical expertise to convince farmers to adopt CA practices, extension agents reported using farmers to motivate other farmers to implement technologies. Most extension agents shared a belief that farmers value their 'own people' (*mundu wiitu)* and, therefore, they are likely to be more receptive to new technologies when demonstrated by farmers from their own community.

> *We have farmers who are quite informed, and they are ready to implement. They are [influencing] the community. Because in most cases the community believe in their own "mwiitu uu witu," (this our daughter) "Kimwana kii kitu," (this our son). [Farmers] believe by seeing and by seeing one of them doing. (David-Ward Agricultural Officer)*

Extension agents reported to work with selected farmers to disseminate technologies to other farmers. These farmers are called trainers of farmers and private service providers. However, as quoted, extension agents regarded both the ToFs and the private service providers as conduits to promote the adoption of CA technology by farmers in their locality:

> *… These lead farmers are community resource persons, they enjoy what they do, and they are available. They are highly accepted by their communities. In my ward we have ToFs (Trainer of Farmers) for conservation agriculture… they have already implemented CA in their farms so wherever we have an activity like trainings and field days we even start with them. (David-Ward Agricultural Officer)*

> *We have private service providers whom we have trained, and these are the farmers who have been with us, they have moved with us for many years. They have adopted and they know how to do most of the CA practices. (Benson-Ward Agribusiness Officer)*

Some of the CA trainers of farmers were quoted to have mastered the technology so well that extension agents referred to them as CA champions. Extension agents therefore enlisted their services to carry out CA demonstrations villages to boost acceptance and adoption of the technology by other farmers.

As reported by participants whenever an opportunity to take farmers for a field trip arose, they gave first opportunity to trainers of farmers and those who had implemented. Extension agents used field trips to reward farmers who implemented CA technologies to motivate them to continue with the practices. Participants also

recommended CA champions for awarding by agencies such as FAO to boost their morale and appreciate their efforts to support extension agents to promote the technology.

Other strategies for supporting farmers to implement the CA technology involve adjusting and adopting CA implements[28] to fit farmers' working environments.

5.6.1 How extension agents addressed the usability of CA implements

Extension agents listed several challenges with the usability of the CA implements such as unfitting yolks. For instance, an extension agent whose farmers used the ox-drawn ripper shared his experience with the implements and how they had to adapt them so they could be used by farmers.

> *Sometimes the technologies are not implementable or not workable. For example, when we started CA, we had ox-drawn rippers for doing the work but then when they were tested the bulls could not pull them. They were not heavy, but the yolks were smaller and therefore we (extension agents and farmers) had to go back to the drawing board. (Abel – Ward Agricultural Officer)*

Similarly, extension agents reported that they experienced challenges while using the manual jab planter. A jab planter is regarded as an easy-to-use CA implement especially for women farmers when planting in steep terrain. However, while carrying out a field demonstration on how to use the tool, the extension agents reported that the women farmers complained that it was heavy and therefore challenging to use:

> *If you take the manual jab planter like the one promoted by PAVID (NGO), women farmers cannot lift it if filled with 2Kgs of seeds and 2kgs of fertilizer. It was so heavy that a farmer said that he would rather use a traditional hoe. These tools are not gender-friendly and some women cannot use them as said by the NGO. (Josephat-Ward Agricultural Officer)*

As reported by extension agents working in the hilly areas, the steep terrain makes it impossible for farmers to use the CA implements:

[28] Farm implements are accessories pulled by working animals or mounted to machines

For CA to succeed mechanization is necessary but here in my ward [hilly areas] it is manual [do the work by hand]. Farmers are doing CA physically because the farm sizes are small, and the terrain is steep. There is no space for a tractor-drawn ripper to turn. If I tell a farmer to use a hoe to dig that CA trench it will look like punishment. (Josephat-Ward Agricultural Officer)

Despite the challenges identified by extension agents, the majority of those interviewed reported working around these challenges to ensure farmers fully utilized the implements. An extension agent who faced the challenge of 'unfitting' ox-drawn rippers shared how in collaboration with farmers improvised to ensure that the technology fitted the 'ground situation':

…. the yokes were smaller and therefore we had to go back to the drawing board, and we decided an alternative way of doing it. We had to improvise some of the implements so that they can suit the areas we are working in. Majority of time we work together with farmers to improve [implements] they bring to us. (Benson-Ward Agribusiness Officer)

The process of improvising the implement is not a straightforward one. According to the extension agent, in such situations he first consulted with the 'owners' of the technology to discuss how to adjust it. Most collaborators were reported to be receptive to the feedback given by extension agents about the implements and, therefore, cooperated in adjusting it.

When something is brought to our attention and it does not work, we go back and sit with [collaborators] and decide on an alternative way of working. We sit down with farmers and the initiators. We tell them our demands and suggestions on how to do it well. If they happen to be rigid, eventually we let it go, but they are rarely rigid. (Benson-Ward Agribusiness Officer)

While in some cases extension agents had a round-table discussion with the agencies and agreed to improve implements, in other situations they chose to withdraw the technology. According to an extension agent who experienced a situation where a technology introduced by collaborators resulted in conflict between neighbouring farmers, they consulted with the 'owners' of the technology to discuss how to adjust it.

The extension agent took on a role as a mediator between the initiators of the technology and the implementing farmers, as he explains:

> *I remember some years back when a [private organization] introduced a technology known as a trapezoidal band. It is a soil management structure which is supposed to harvest water, but after we implemented it, our farmers said it was bringing conflicts…The structure occupies a large area which means that it extends to the immediate neighbor's land. So, in one of the forums we (extension agents) told [the initiator] it was not working. So, we sat down discussed it and we decided to put it aside (stop implementing it) and then we changed to Zai pits. (David-Ward Agricultural Officer)*

An extension agent reported encountering situations where different collaborators introduced either similar technologies or different versions of the same technology. In such circumstances, extension agents reported that they used their technical expertise to evaluate and advise farmers on the better choice. As quoted by an extension agent whose farmers experienced this dilemma, his advice to farmers on the choice of technology was mostly informed by the technology's applicability and effectiveness.

> *You know every collaborator is coming with his or her own technology. We accept all the technology, but we compare them. If one is better than the other, then we make a choice. Even if they are bringing the same kind of services, we usually check whether the current one a collaborator is bringing is more advanced than the older one. If it is then to us, it is okay since it means that we are advancing. For example, conservation agriculture is being promoted by various collaborators, and we are aware of that. That is why we check the advancement of the service because there are so many methods of conservation, so we do check and advise farmers on what to go for. (Abel – Ward Agricultural Officer)*

An extension agent who works in a ward where two agencies introduced a technology that applied a similar principle, explained how he utilised his technical skills to evaluate and advised farmers to choose the more efficient and effective version.

> *For example, Farm Inputs Programs-Africa (FIPS-Africa) introduced the planting basins technology to our farmers, but they later said that it is tiresome to dig and expensive to buy the polythene paper to lay*

at the bottom. But another collaborator introduced the Zai pits' technology. Zai pits hold more water and you put 9-10 plants per pit if you are growing maize. Zai pits are therefore more advanced than the planting basins. If it is good, I recommend to farmers to adopt. (Abel – Ward Agricultural Officer)

Extension agents work with women farmers whose efforts to implement the technology are limited by existing socio-cultural practices. The majority of participants acknowledged the contribution of women to the adoption of climate smart technologies such as the Zai pits and conservation agriculture. Extension agents and participants from the agencies that introduced these technologies reported that 60% of the farmers who turn up for capacity-building and outreach activities are women. Women also make up 80% of farmers who are leading in implementing and disseminating conservation agriculture to other farmers. However, according to the participants, the embedded socio-cultural rules that regard men (husbands) as the sole decision-makers on the use of family land are an obstacle to technology adoption in the larger Makueni county. Such cultural practices are said to impede women farmers' efforts to implement technologies after they have been trained.

90% of the farm work is done by women …The ladies are now the entry point, since they are the people, you find at home. Even the men who attend our trainings; when you go to their households the person who is doing the actual [work] is the lady and the children, not the man. The man is more of a supervisor. So, they [women] are our focal persons…. Yet they cannot make decisions; that is why the uptake of technologies is lost down the system. (Nzangau-Ward Agricultural Officer).

An extensionist who works in the semi-arid part of the county shared a story about his gender-related experiences with promoting Zai pit and zero tillage technologies in his ward:

For example, in CA we are strongly advocating for use of rippers instead of the disc plough. When you introduce the ripper to women farmers, when the man [husband] comes home at the end of the month, he trashes that as nonsense and takes the oxen plough and ploughs all the land. The other technology is the Zai pits, men say digging holes is cumbersome. He does not see the importance of them in mitigating against climate change. I had one gentleman who

the first time he found Zai pits in his farm he ploughed them down, then he went back to the city, the wife remained consistent. So, she moved to the next plot and dug some more. It so happened that the rain was not good so when the man came back home for holiday, the crops were mature, but he could not believe the good performance of the crops in Zai pits and the poor crop where he had insisted ploughing to be done. After seeing such results, the husband immediately said, "no more oxen ploughing in his shamba (farm)." So, he supported the lady to dig more Zai pits. So, if we are to succeed, we must look at the complexity of gender inclusivity in whatever we are doing. (Nzangau-Ward Agricultural Officer).

According to the participants, most agencies who introduce new technologies seldom address these dynamics. Extension agents, therefore, devised strategies to boost the adoption of these technologies in the face of this socio-cultural challenge as they believe they can help farmers combat the impacts of climate change. Participants who encountered this nature of challenge reported advising the women farmers on how to convince their husbands to allow them to try the new technology.

One strategy that has worked is during planting season is to ask men [husband] to divide the land and allocate a small section in the garden where women (wives) go and practice 'their CA.' Later, when the season is over, if the woman's crop does well, slowly men start yielding to pressure to change and that is how we have achievements in CA. (Alice-Ward Agribusiness Officer)

…the trick is to convince the lady, let her be empowered to convince the husband, the success rate will be high. Where the lady has been consistent and has shown the relevance of the Zai pits and conservation agriculture, the husband becomes an instant supporter of agriculture. (Nzangau-Ward Agricultural Officer).

Other extension agents advised women farmers to request other household members to attend the trainings, if possible, as a way of winning their support in implementing the disseminated technologies.

… we plead with ladies whenever we give them the technologies they should talk to their husbands and convince them. If the men are around, we tell them to come with them to the training so that they

can also hear why we are saying this. (Nzangau-Ward Agricultural Officer).

A participant from an NGO who engages local extension agents to implement its activities employed an approach which aligned to that of the extension agents. As quoted, the NGO approach allowed both spouses to attend farmer training together to ease the decision-making process in areas such as technology adoption.

participants as possible to engage the husband and the wife in the trainings if they are available. The information that goes to the husband also goes to the wife and vice versa. It makes it easier to make decisions on issues about farming and agriculture. (Program Manager-NGO 2)

Extension agents working in areas with projects and NGOs grappled with what a participant termed as a technology vicious cycle. Farmers are said to adopt new technologies when they are introduced but stop practising them as soon as whichever organisation who introduced them leaves. Extension agents partially blame this habit on the periodic nature of projects and the failure of agencies to plan on how to engage farmers beyond the project's life as quoted:

[Organisations that introduce technology] do not make them sustainable. That is the problem with donor and government projects. We do not make farmers see 'this is the [technology] I should adapt for my farm.' If we visit farmers, they will tell you CA 'ilikuwa ya FAO' (CA belonged to FAO) but now that they do not see the FAO staff visiting and talking about it then they say 'hio tumemalizana na hio' (we are finished with that technology). So, life continues. Until someone else comes with another CA project then we pick up from where we stopped. It is a vicious cycle. (Josephat-Ward Agricultural Officer)

However, as the extension agents find the technologies useful, most of them reported working to sustain them by continuously retraining farmers in their day-to-day extension work. Extension agents reported constantly reminding farmers to adopt and maintain CA practices through outreach activities such as farm demonstrations and field days. As the following quote explains, farmers revert to old practices if not reminded.

We extension agents] are discouraging old practices and encouraging new ones like CA through a series of activities such as

training on new practices and, demonstrations. …We hold events such as field days to showcase the CA practices and the success stories. …These interactions with farmers are made to reinforce CA messages, otherwise they go back to the old ways (practices).
(David-Ward Agricultural Officer)

5.6.2 **Summary**

The experiences shared by extension agents in promoting CA technologies describes the complexities of disseminating new technologies to farmers. Extension agents have demonstrated how they navigate through diverse social, technological, and economic circumstances to support farmers to implement and benefit from new technologies. They convince, adjust, prove, negotiate, arbitrate, and advise farmers. Extension agents used field demonstrations and field trips to display the CA technology and to convince farmers to adopt it. Farmers were reported to believe in their own person and, therefore, extension agents demonstrated how they leveraged off these cultural beliefs to 'use' Trainer of Farmers to train local farmers and to boost the acceptance of CA technologies. Extension agents further leveraged off farmers regarded to have successfully adopted the CA technology to train and influence fellow farmers to adopt these technologies. While CA implements and tools were found not fitting the ground situations, extension agents demonstrated how they negotiated with agencies to improve the utilisability by farmers. Extension agents tapped into the experience of local farmers to improve and adjust CA implements to fit the local farming environment.

In situations where agencies introduced similar technologies, extension agents reported using their technical knowledge to help farmers make a choice. They influenced farmers' decisions by advising them on the technology that better fitted their environment.

Women implementing CA practices reported facing challenges. Extension agents used their knowledge of the local culture to advise women on how to convince their husbands to allow them to partially implement the CA technology. They also aligned with a local NGO's policy of inviting and training both family members to increase their understanding and reduce conflicts at home.

5.7 **Disseminating old, but improved technologies**

Disseminating old, but improved technologies as described by participants in the next section illustrates a different genre of challenges such as deeply held cultural beliefs

around certain food and the association of crops with social status. In the following section, I use sorghum production to describe how extension agents change farmers' mindsets towards accepting useful, improved, but abandoned technologies. The section illustrates how extension agents work with other agencies to change the mindsets of farmers from a preferred crop that performs poorly, to grow sorghum which is less preferred, yet adaptable to the local ecological conditions. While extension agents used similar strategies as those used to disseminate new technologies such as field demonstrations, in this case, the motives differed. For instance, extension agents used field demonstrations for farmers to see the impact of the technology but, in this case, they used cooking demonstrations for farmers to taste different sorghum recipes. However, in both cases, extension agents used the experiences to enable farmers to make informed choices on both technologies.

5.7.1 How extension agents re-introduce old, but improved technologies

According to participants, the agro-ecological condition favoured sorghum production and that sorghum is a better food security crop compared to maize due to its ability to yield well in areas that receive low rainfall. An extension agent working in ecological zones 4 and 5 explains why he promoted sorghum crop in his ward.

> *The rains are not good here. We had a total failure except for pigeon peas and sorghum in the recent season... we tell farmers "Do not go consider growing sorghum and pigeon peas otherwise you will frustrate yourself." And that is why we recommend drought-tolerant crops since they can perform well in this hostile environment.*
> *(Nzangau-Ward Agricultural Officer)*

However, according to participants, sorghum is not a new crop in the region, but a crop that farmers stopped growing in favor of maize, which has become a staple food in recent years. Participants described farmers' love for growing maize as some form of obsession since they keep growing the crop, even after frequent crop losses. Extension agents interviewed view farmers' fixed mindsets about maize as a hindrance to their efforts to promote sorghum production.

> *Farmers' mindsets and attitudes are to blame for their inability to grow crops that are suitable for the ecological zone. People here believe that you can only have food when you are producing maize. When maize fails, they say we have crop failure. But they know it is*

not a maize zone at all. Also, it is not that they do not know any alternative…they know sorghum is a lifesaving crop, but they still plant a lot of maize despite the many failures (Oscar-Ward Agricultural Officer).

Our farmers are addicted to maize and we have tried to change their attitudes, but they do not listen. It is like if a farmer does not grow maize, then he/she is not a farmer. Maize has become a cultural crop (Mwololo-Ward Agricultural Officer).

The participants' opinion was that farmers take a long time to change their mindset and that slows their ability to transition to new forms of livelihood, even when that is the only possibility. An extension agent whose farmers are 'stuck' on growing maize shares how this mindset frustrates his efforts to convince them to grow sorghum, sell it, then buy maize from the market:

… farmers have been frustrated by the rain… Sometimes they do not grow anything…. but they have a problem of mindset because they take a long time to decide 'let us move from this maize and grow sorghum" since they are used to growing what they eat (maize). They do not believe they can buy maize from the market. (Masaku-Ward Agricultural Officer)

However, through their interactions with farmers, extension agents reported learning some of the community's deeply held beliefs that explained partially why farmers in Makueni do not grow and consume sorghum like other communities in the country. As quoted by two participants, farmers preferred sorghum as poultry feed and, therefore, associated eating it with eating chicken food. The community also viewed sorghum consumption as an indicator of household poverty. Extension agents felt that such beliefs negatively affected their effort to boost food security and eradicate the community's reliance on relief food.

In my day-to-day extension activities, I talked to some of them and I discovered that farmers hold a notion that "If you eat sorghum, you are poor" (Shadrack-Ward Agricultural Officer).

KCEP-CRAL project has introduced sorghum but you realize the farmers do not eat sorghum and that is deep rooted. They do not consume it because they say it is poultry feed …. they say they are

not chickens to feed on it, yet it is a crop best suited for the area" (Jacob-Ward Agricultural Officer).

Extension agents from areas regarded as potential for sorghum production, highlighted the qualities of some of the local varieties which hindered farmers from growing and consuming sorghum. As quoted by participants, farmers complained that some sorghum varieties have a bitter taste while others shunned from growing the crop due to the menace of birds. Farmers were reported to lack resources to scare away birds since their children are not home to do it.

Some sorghum varieties, especially the red varieties, are bitter hence not palatable, that is why only poor families that cannot afford maize meal consume it. (Oscar-Ward Agricultural Officer).

Farmers abandoned growing sorghum because of birds. Birds are a real problem to the sorghum crop. In the early years when farmers used to grow sorghum, kids used to scare birds away and they also used to grow the crop in large numbers (mass production). But they are now complaining that all kids go to school at an early age as everyone is focusing on education so there are no kids at home to chase birds. The only people at home are the parents who cannot manage alone. (Mwololo-Ward Agricultural Officer)

A participant working as a seed breeder reported that farmers lacked access to improved seed varieties of sorghum, either due to seed unavailability in the market or its unaffordability.

We realised, as researchers, farmers do not have access to the right type of seed, and if they access it, it is very expensive. (Seed Breeder-Research Organisation 1)

Farmers were also reported to shun growing sorghum due to lack of available market. Interviewed extension agents said that farmers feared getting 'stuck' with the crop after harvesting since the few available buyers preferred the sweet variety, which was more challenging to grow due to the birds eating the crop. An extension agent working in a ward with potential for sorghum production explained how marketing challenged impacted farmers' morale:

Farmers do not want to grow sorghum since it has no good market. They (buyers) want the sweet variety yet farmers fear it is due to the

problem of birds. Lack of market is not only a challenge to farmers growing sorghum, but also by those growing crops such as green grams and cow peas. (Mwololo-Ward Agricultural Officer).

To boost sorghum production and consumption in the county, extension agents reported using multiple strategies to address farmers' concerns and to persuade them to change their mindsets. First extension agents reported leveraging on research work by ICRISAT[29] to access the new improved [sweet] varieties of sorghum. The following quote describes how the researcher relies on local extension agents to disseminate the new varieties to farmers:

[ICRISAT] research mandate is to develop new varieties but to make sure that is passed to the end users (farmers) and we do not work alone. We work with county extension staff … these are the people on the ground with the farmers; any technology you have you pass it to [extension agents]. They are the people who support farmers technically; you give them all the technologies then they will take it to the farmers. (Seed Breeder-Research Organisation 1)

ICRISAT released two varieties, *Gadam and Kari Mtama 1,* which are sweet and suitable for arid and semi-arid areas, as explained by the breeder. Extension agents reported teaming up with ICRISAT field staff to organise field demonstrations for the new sorghum varieties at the village level. As noted by an extension agent, the demonstrations act as learning sites for all farmers in the area. Extension agents also reported using the demonstration sites to convince farmers to grow the new varieties.

We [ICRISAT] have developed very palatable and well digestible varieties [of sorghum]. The work of extension officers is to inform the farmers we have these varieties, and how good they are….so we are persuading them. We hope those who have planted and harvested well can encourage those who have not yet adopted. (Seed Breeder-Research Organisation 1)

While extension agents reported that farmers appreciate seeing the new varieties in the demonstration sites, farmers complained about the cost and availability of the new

[29] International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)

seed varieties. To address farmers' concerns about seed availability and cost, local extension agents reported collaborating with ICRISAT to supply certified seeds to farmer groups and to support them to set up village seed banks.

ICRISAT uses two models: village seed banking and "seed merry-go-round,' ideas which, according to the breeder, potentially address the problem of seed unavailability. Seed bulking involves selecting a few farmers to grow the new varieties away from other farms growing sorghum to avoid cross-pollination. After harvesting farmers store the seed in the established village seed bank for future access. A breeder describes the extension agents' role in supporting farmer groups to grow the new varieties and set up village seed banks. Extension agents interviewed supervised farmer groups to ensure effective seed production and storage and to ensure farmers accessed the stored seeds.

> *We [ICRISAT and extension agents] are training farmers on production of seeds. Together we trained farmers on seed bulking ...farmers have seed banks where each seed producer will bring their seeds and other farmers can access it from there. What farmers store is a superior quality seed. Seed banking has been tried and has been found successful." (Seed Breeder-Research Organisation 1)*

The seed merry-go-round[30]' model blended formal and informal institutions, whereby farmers formally sign an agreement to receive and return an equal amount of sorghum seed after harvesting. Farmers were informally accountable to each other and that ensured each one of them returned his/her share of seeds at the end of the season. The seed that farmers returned was passed to other farmers in the coming seasons. According to the breeder, seed bulking and sharing practices helped farmers access certified seed in developing countries. As quoted by an extension agent who participated in the program, his role was to popularize the concept and ensure farmers responsible for seed bulking produce quality seed share it with other farmers in the village.

> *My [extension] work is to carry out farmer mobilization, seed distribution, and oversee the multiplication of the seeds in selected farmers' farms, then later distribute it to other farmers…because of*

[30] A situation whereby seeds revolve in turn from one member to another until all receive it

that the number of farmers using certified seeds keeps multiplying.
(Benson-Ward Agribusiness Officer)

To boost extension activities, local extension agents in collaboration with ICRISAT trained Trainers of Farmers (ToFs) to train and support other farmers to produce and to bulk cereal seeds. Local extension agents recommended potential ToFs to the program then later participate in building their skills to carry out the work. As mentioned earlier, extension agents regarded farmers successfully adopted technologies as technology champions and, therefore, leveraged on their experience and success to convince other farmers to adopt. Extension agents believed that farmer-to-farmer extension boosted the adoption of technologies, as farmers are likely to value a technology when they see other farmers apply it and succeed. As mentioned earlier, farmers shun eating sorghum as they see it as food for the poor and birds. To change this mindset, extension agents in collaboration with ICRISAT[31] conducted cooking demonstrations using different sorghum recipes to show farmers multiple ways of utilizing the crop. The main object of these cooking events was to change farmers' mindsets towards consuming sorghum and enhance the adoption of sorghum as a climate-resilient food and nutrition security crop.

…we are changing the mindset that sorghum is chicken feed through the value addition activities that we do with farmers. We are training them on how to cook sorghum chapati and they are really appreciative. They are very nutritious, delicious, and very palatable.
(Seed Breeder-Research Organisation 1)

The message of the health value of sorghum also enables the farmers to understand that sorghum is not food for the poor.
(Shadrack-Ward Extension Officer)

Extension agents also integrated the messages of nutrition and food security in their training. According to an extension agent who oversees Agri-Nutrition[32] , the public is

[31]International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)

[32] Nutrition-sensitive agriculture is a food-based approach which ensures the production of a variety of affordable, nutritious and culturally appropriate and safe foods in adequate quantity and quality to meet the dietary requirements of populations in a sustainable manner GoK (2020).

aware of lifestyle diseases such as diabetes and, therefore, she uses such reasons to motivate the community to grow and consume sorghum.

> *Sorghum is good for people suffering from diabetes since it releases sugars slowly. We are integrating health and agriculture because that is where the world is. (Seed Breeder-Research Organisation 1)*

As highlighted earlier, farmers shunned growing sorghum due to the lack of a ready market. Most extension agents felt that connecting farmers to potential buyers potentially motivates farmers to grow sorghum.

> *What I have seen is that the market is the one driving the production of the crops. You see a farmer will harvest around 12 bags of sorghum per acre and he cannot consume that. Therefore, a market will act as a motivator to farmers to grow [the crop]". (Seed Breeder-Research Organisation 1)*

Some extension agents were unable to connect farmers to the potential sorghum market. Therefore, they reported using the networks created by some private organisations and donor projects to link farmers with potential buyers. The extension agent's role was to mobilise farmers and ensure they tapped into the marketing opportunity created by these agencies, as explained by the following participant:

> *.. last season my farmers were impressed. I was also happy because I have never seen an organisation linking farmers to the market…the East Africa Breweries Limited (EABL) is now buying our sorghum. My farmers must take that advantage. (Mwololo-Ward Agricultural Officer)*

Furthermore, to ensure farmers meet the volumes demanded by the buyers, extension agents support sorghum farmers to form marketing groups and bargain for better prices. Here, the extension agent's role is to ensure farmers adhere to the demands of the buyers so that they do not miss the marketing opportunity for the sorghum crop.

> *We are telling farmers to come together and aggregate their produce and sell as a team so that they can have bargaining power and prices. So, the business aspect can be used to change farmers' minds. (Seed Breeder-Research Organisation 1)*

> *...We have groups of farmers ranging from 20-30 members, which make clusters and from a cluster we identify an aggregation store*

where the buyer can collect the produce from. So, when the buyer comes, he picks it from there and then pays farmers on the spot. It is good for farmers. (Kingston-Sub-County Agricultural Officer)

In summary, through field demonstrations, extension agents persuaded farmers about the performance of the new varieties of sorghum. Extension agents leveraged on the work of a research organisation to access new varieties of sorghum for farmers. They teamed up with the research organisation to carry out field and cooking demonstrations to convince farmers to adopt the crop and consume it. Extension agents reported to learn and support farmer group seed banking and seed merry-go-round activities to boost the production, storage, and accessibility of certified seeds. Extension agents worked with farmer trainers to disseminate the technology and boost its acceptance by other farmers. Extension agents leveraged on market opportunities created by their network of actors to motivate more farmers to grow sorghum.

Besides supporting farmers to implement different technologies, extension agents reported supporting farmers to implement multiple donor and government projects.
The following section discusses how extension agents working in wards implementing projects ensured farmers benefitted from them, and how extension agents legitimize project activities at the ward level to ensure successful implementation.

5.8 How extension agents do project work

Extension agents reported that most decisions about donor projects occur at the national and county levels. These decisions revolve around selection of wards to implement the projects in and setting budgets for the implementation of the activities. Field extension agents reported participating in these meetings at the county or sub-county level to provide more-field specific information which aids the project team to plan better.

5.8.1 Guide projects team on areas suitable for implementing activities

Extension agents working in wards implementing both KCEP-CRAL and NARIG-P, offered technical guidance on areas that were suitable ecologically for the implementation of the selected crops and livestock value chains. As noted by the extension agents, the motive for sharing on-the-ground information was to ensure that project activities were directed to the most suitable parts (villages) in their wards and that farmers in those areas would benefit fully. Extension agents implementing projects drew on their understanding of the wards to support decision making by project team:

When the KCEP-CRAL team came to the county headquarters, they came with a package of what they wanted to implement. But they did not know where it can work well so we were called into a meeting to advise them about where in our area the crop or enterprise can do well. We do this so that our farmers benefit fully. (Benson-Ward Agribusiness Officer)

At the project inception level, they involve us first in the exchange and sharing of ideas about our farming community. From us we are sharing information with the project team and they get to know the kind of environment we work in …. Remember, our interest is the farmers. (David-Ward Agricultural Officer)

5.8.2 Ensure equitable distribution of projects in the wards; ensure smooth running of projects

In wards where extension agents were implementing the two projects, they were mandated to ensure that project activities went well and that project resources were equitably distributed across the wards. Participants working in wards with more than one project tapped on their understanding to distribute projects to different parts of their wards, depending on the focus and the availability of other projects in the same area. As quoted, participants were keen on a fair distribution of projects to different villages and farmer groups.

We advise [project team] because they will not cover the whole ward, they will just pick two to three locations…. when the others (project) come we take them to an area that was not covered by the other ones. We advise them on that. (Rita-Ward Agribusiness Officer)

...We [extension agent] prioritise. Some groups are given to county projects. If an area has several NGOs and collaborators and another program comes in, we take it to a separate site. And we do it on different sites…at least every area has something (project activity). (Benson-Ward Agribusiness Officer)

Extension agents reported utilising their understanding of local ecological conditions and the nature of livelihood activities of farmers in their wards to advise the project team on where to implement activities. An extension agent involved in implementing the KCEP and NARIGP projects shared how he zoned his ward to enable matching of project activities with ecologically suitable areas. Participants felt that the project team

tapped on their knowledge of local farmer groups and their relationship with the groups when implementing projects, for example, in value chains projects.

> *We have zoned our area where the rain is very low, high, or medium. So, if it is fruit, we know in this ward the upper side like Muusuni, Kiumoni is best for fruit. So, if they (project team) come, when called on board we give our guide on where to take the project. For example, if it is sorghum, we guide them on where to meet the farmers, who (farmer) can do it and where the soils are best for the same. We have those consultations. (Benson-Ward Agribusiness Officer)*

> *You see I have worked here for a long time and I also come from here and I know the area. So, they are taking advantage of me since I know the groups, I know the groups they are targeting. So, if they come, I take them to the right groups. (Robert-Ward Agribusiness Officer)*

Another participants allocated different projects to different farmer groups to ease monitoring of project activities.

> *You find that like in my ward there are farmers implementing KCEP-CRAL project and other implementing NARIG-Project. So, it is my role to organize them in a way that you do not mix the two groups of farmers. By organizing my work, I ensure there is smooth running of our activities in the ward. (Evelyn-Ward Agricultural Officer)*

While allocating different farmer groups to different projects was deemed a strategy to facilitate project, one participant saw it as a solution to the farmers' inability to differentiate between government projects from donors and NGO projects. The ward extension agent shared a scenario about when a county government's project team visited, and farmers praised a local NGO for giving them farm inputs but failed to mention the inputs received from the governor. To avoid such 'embarrassment' the participant reported allocating the different project to different villages and farmer groups.

> *[the county) gave us resources to go and work with farmers but later we went again and met farmers and we introduced a certain NGO…Later when government officers went their farmers only talked*

about the NGO…it was embarrassing so we organize ourselves. (Gladys-Ward Agricultural Officer)

Interviewed extension agents mentioned ad hoc projects, such as emergency projects due to floods or drought, that are initiated by the county or the national government. An extension agent who implemented an ad hoc project reported to 'just fit' into the already designed plans as outlined in the quote. This shows how extension agents navigate through projects that allow some level of negotiations and those without.

Sometimes [county government] do not plan with us. They only come with their plan to us so that we implement. We fit in their plan and implement. When they want anything else to be done…They come with it, and we do what we are supposed to do, and they do their part, and they disappear. (Robert-Ward Agribusiness Officer)

5.8.3 How extension agents mobilise farmers for project activities

Most field extension agents regarded themselves as the link between project teams and farmers. Most reported to supervise farmer mobilisation, convene project inception *barazas* and oversee the day-to-day implementation of project activities.

From the word go they [project team] come with everything…. the technology package (input loan), but our work is to sell the idea to farmers. So, we mobilise farmers and tell them what the project is about… (Gladys-Ward Agricultural Officer)

However, a participant implementing the KCEP-CRAL project expressed her frustrations with mobilizing farmers to attend project inception barazas. Some farmers were said to take for granted the call by extension agents to attend the barazas, apply for inputs and attend training sessions.

.. the farmers have taken it as if [the project] is not something worth … even when we call them for meeting (baraza) they do not come, they seem to be knowing yet they do not know anything. (Gladys-Ward Agricultural Officer)

To achieve a good baraza attendance, extension agents utilised various strategies to mobilise farmers for the projects. Most extension agents mobilised farmers through word of mouth (tell a farmer to tell another), through farmer group leaders and local administrators. An extension agent who reported working closely with the Area Assistant Commissioner and village chiefs, regarded these local administrators as

figures in the local community and, therefore, farmers were likely to attend barazas if publicised by the administrators. Participants regarded chiefs and village elders as well-networked and, therefore, best placed to pass on information to the majority of households in the wards. To boost their working relationship with these administrators, an extension agent ensured that any visiting project team observed local protocols as quoted.

> *Every program has activities that they want you to support them on. For example, if they want you to mobilise farmers for activities on an agricultural project, then I inform the local administrators, chiefs and their assistants and the Assistant Commissioner. My work is to introduce them to the relevant people. I usually tell the collaborators this is the way to do things here [through the administrators]. If you want to meet the community then one must go through the right channel. I do not want them [local administrators] to feel like I am bringing strangers to the office. That is the role I play. (Shadrack-Ward Agricultural Officer)*

Since extension agents believed in the potential of these projects to impact on the community's food security, they employed certain strategies to build the confidence of farmers to register for the project. Some participants reported to *bembeleza (*pleading with) farmers to attend the forums and register for the project:

> *… we convince them to take up the project. So sometimes we must bembeleza (plead with) farmers to attend. (Gladys-Ward Agricultural Officer)*

Most extension agents regarded themselves as responsible for ensuring that farmers understood well project demands. For example, the KCEP-CRAL program provides farm input loans to individual farmers, while the NARIG-Program provides non-refundable project grants to farmer groups. Therefore, the role of extension agents, as explained by a participant, was to interpret and translate into simpler terms project terms and conditions to farmers to help them to make informed decisions.

> *Farmers must get informed well about these projects. We prepare them for these new projects and ensure they know what the projects expect them to do, like paying [input] loan. (Alice-Ward Agribusiness Officer)*

Sometimes, farmers were reluctant to enroll in these projects. The extension agents considered farmers to have legitimate reasons for not registering for the projects. For example, farmers were reported to be reluctant to apply for the input loans due to the fear of defaulting on repayment. Others were said to be reluctant to apply for loans since the input package included the sorghum crop which they did not want. Sorghum is not popular with the local community and, therefore, farmers in regions selected to grow it were said to be reluctant to apply for inputs. An extension agent cited communication between the project team and farmers as crucial to building the confidence of farmers to enlist for the projects. The extension agent mediated between the projects team and farmers to ensure farmers are knowledgeable enough to decide to minimise future tension as quoted.

> *We act as a link between farmers and the new projects being implemented … we educate them…. we try to ensure that the farmer has the right information. So, we intervene and explain to them what is needed of them to avoid future conflicts. (Gladys-Ward Agricultural Officer)*

Since projects are part of extension agents' annual performance contracts, a participant reported to also *bembeleza*[33] her farmers to enlist for the projects to achieve her Key Performance Indicators (KPIs):

> *…. And because I must perform, I must work hard and go to farmers and convince them since I must achieve my performance targets. (Gladys-Ward Agricultural Officer)*

5.8.4 **Advise farmers on how to apply for the loans and recommend them for funding**

Extension agents in wards implementing the KCEP-CRAL project mobilised farmers to apply for the input loans and provided them with technical advice on how to apply. Extension agents vetted loan applicants and made recommendations to the project team as to whether the applicants (farmers) had the land resource to implement the

[33] Bembeleza is a Kiswahili word that is used mostly to beg and plead with children especially when they are reluctant to eat or to stop crying. In this context the word is used to denote the action of extension agents of going beyond just talking to pleading with farmers to attend forums.

project and the financial resources to repay the loan. Participants shared a belief that supporting farmers to access inputs provided by the project would help them increase crop productivity and that would boost household food security.

> *We give farmers the application form to fill and then we showed them how to fill it. Later they return the forms to us and we send them to the project office. (Nzangau-Ward Agricultural Officer)*

Extension agents reported that the KCEP-CRAL project team relied on their knowledge and relationships with the local farm input dealers (stockist) to determine their suitability and capacity to supply inputs to farmers. An extension agent working near a major town where most of the dealers are based, participated in vetting potential input stockists, and the project team relied on his recommendations to award the inputs supply contracts.

> *We (extension agents and project team) have selected agro-dealers who will supply farmers with farm inputs. Most of them are the ones I know. So once farmers are given e-vouchers they will go to these agro-dealers with the card and swipe and get their inputs. (Mutembei-Ward Agricultura Officer)*

5.8.5 **Supervising and supporting farmer group formation and capacity-building**

Most projects required farmers to be organized into groups to facilitate access to training as well as to assist them to collectively perform activities such as marketing their produce. Extension agents supervised farmer-group selection and training. At times, when projects required them to mobilise groups at short notice, the participants reported recruiting existing farmer groups to facilitate the rapid implementation of activities. Extension agents reported picking local groups to implement non-agricultural activities such as table banking[34] and, through consultations, aligned the group's activities with the expectations of a project. Other participants preferred to pick groups that had previously implemented project activities, since such seasoned groups

[34] Table banking is a group-saving strategy where members from a particular group contribute their savings and borrow immediately and repay with an agreed percentage of interest. Literally, money contributed is put on the table and borrowed immediately by members.

understood ‘project language.’ Therefore, they were not likely to ‘shame’ extension agents in front of project teams.

> *They are farmers who have been with us, who have moved with us for some years. They have adopted and they know how to do most of the practices. So, at times when opportunities come (projects) we call upon them. (David-Ward Agricultural Officer)*

Some extension agents recruited existing farmer groups as they considered that such groups were cohesive and, therefore, it would be easier for members to ‘push’ each other to implement project activities. After recruiting farmer groups, extension agents reported evaluating farmer training manuals to ensure that the information relayed to farmers was technically sound and that the needs of farmers were addressed.

> *We have the Kenya Agricultural and Livestock organization (KALRO) who are a stakeholder in the KCEP-CRAL project. We sat with them and validated the farmer training materials. (Oscar-Ward Agricultural Officer)*

Extension agents are often tasked by project teams to supervise Trainer of Farmers (ToFs) to ensure they convey the right technical information to other farmers. For example, the KCEP project hired private service providers to work alongside extension agents to train farmer groups due to staff shortages. Participants enlisted the support of private service providers when they were unable to meet the project’s demands in time.

> *KCEP-CRAL project has employed some private service providers. So, we work with them when we are doing group formation and group trainings because the work at times is a bit overwhelming. We deploy them to groups for training. For us is to do a follow up and see what they are doing. (Ndolo-Ward Agricultural Officer)*

5.8.6 **How extension agents supported farmers group applying for grants**

Regarding the NARIG-P project, extension agents supported farmer groups in decision-making about the choice of suitable farming enterprises to implement. The project utilised decision-making tools to assist farmers to identify and rank community problems and solutions. Extension agents used their technical knowledge on proposal writing to guide farmer groups applying for grants to ensure the proposal met the standards set by the project. The grants are competitive and, therefore, such guidance also improved the groups’ chances of qualifying for the grants.

In our ward we are implementing the NARIG project …we supported farmers to carry out the need analysis. We were helping farmers analyse their livelihood activities through consulting and ranking. And at the end they chose an enterprise that is easy to implement and that has a higher return. After that we had to guide them in making grant proposals. (Alice-Ward Agribusiness Officer)

Extension agents provided the NARIG-Project project team with confidential reports about the farmer groups applying for grants. The project team relied on the opinion of the extension agents about the ability of the group to implement activities to decide whether to approve or reject the grant applications. An extension agent who participated in the vetting of farmers' groups explains why the project team relied on his decision:

Remember the interest is the farmer, through us they can know the individual farmer, they are also able to know the success stories of the groups, they are also able to understand how our community-based organisations and groups operate. And what the groups do. (David-Ward Agricultural Officer)

Extension officers working in wards with both KCEP and the NARIGP project explained she used work planning as a strategy to ensure she met the diverse demands of the projects.

The good thing is these [project] demands do not come on the same day. Like today we have NARIG, and the KCEP-CRAL activities will pick up in the next month. If all people want my attention, I plan my time. I come early and work because I do not want to disappoint someone [projects, farmers]. I mix things [plans] here and there and combine activities when possible. (Lydia– Ward Agricultura Officer)

…once I get the resources then I arrange how to meet the targets. You can do the work in different dates, or I can do the work for a project for half a day then in the afternoon I do work for the other one. We use our own wisdom because you must have the work done. (Gladys-Ward Agricultural Officer)

To deliver multiple duties, as discussed earlier, interviewed extension agents shared how they glean for resources to do their job and to support farmers to enhance their

livelihood. The following section describes strategies extension agents use to access resources from the Government, project, NGOs, and private service providers.

5.9 How extension agents glean for resources to deliver extension services to farmers

Past studies show how public extension services grapple with declining public funding, under-staffing and over-reliance on donor-funded projects to deliver services to farmers. In this study, participants grapple also with a transition from centralised government to a devolved system of governance that demands a change in public resource planning and financing. The section first explores how extension agents navigate through the transitioning system of governance to access resources to support farmers, implement KPIs and legitimise their job to farmers and the Government. The section explores how extension agents 'make do' with the limited resources to support farmers implement technology that enhance their livelihood. Further, the sections explore how extension agents build networks with agencies and how they leverage off resources embedded in these networks to address multiple farmer's needs.

5.9.1 Public participation is a must in Makueni County

The county government of Makueni was amongst the first counties to operationalise civic education and public engagement procedures through public participation. While most interviewed extension agents have come to terms with the "new norm", the majority of participants grappled with institutional direction in the new governance system. Public participation is an institutional requirement under the devolved system of governance which gives the public (citizen) an opportunity to voice their development priorities and it is among the values and principles underpinning the Kenyan public service. As explained in the case description, during the past regime, extension agents participated in the ministerial planning and budgeting of resources, however, the new constitution shifts that power to citizens and elected representatives.

The following subsection describes extension agents' experience with the process and challenge of relying on community members to identify and prioritize agricultural and extension service delivery needs. The sub-section further describes how extension agents navigate through these challenges and how they circumvent the system to ensure critical extension resources are factored in the budget.

Interviewed extension agents acknowledged the public participation process, however, some expressed a sense of powerlessness due to their inability to influence resources

allocation for extension services. As quoted by participants, the survival of public extension services depended on the ability of the local community to see the value of the services and reciprocate by prioritizing them in their local public budgeting forums.

> *In Makueni public participation is done all the way from the village level to the county level. The project communities list at the village level are the ones that are listed in the ward, sub-county and at the county level. So, if they [community] do not list agricultural projects that fiscal year then we do not have any specific agricultural activity or programs apart from what is now coming from the donor projects that we have here. (Shadrack-Ward Agricultural Officer)*

While extension agents interviewed acknowledged the efforts of the Government to actualize public participation in the county, from their experience, the process does not always guarantee the desired outcome. First, participants expressed fear that some local political leaders did not understand the contribution of extension services to development. Therefore, since the inception of the county government, extension agents struggled to convince the local leadership of the value of extension services and the need to resource it. A participant shared how they struggled to convince leaders of the impacts of extension work and therefore funding for extension.

> *The funding is low. In fact, the other time we were with the governor, he said he does not see the work extension staff are doing. But we told him that agriculture is a long-term investment. The services are indirect and more on skill and knowledge development. (Ndolo-Ward Agricultural)*

Secondly, extension agents interviewed felt that political leaders and the community (electorates) valued more physical projects such as construction of roads, health centers and sinking of water boreholes since they can be counted. Extension services received less budgets since the outcomes are intangible or take a long time to see the impact.

> *…as you know the county government, they want tangible results, but you know extension is a [intangible] service and therefore you cannot see the benefit directly like a hospital or road. If you construct soil conservation structures, it takes time to see the benefit or results. (Mutembei-Ward Agricultural Officer)*

An extension agent working in a ward where farmers always asked for water boreholes associated the community's "madness" with water, partially to their long struggle with water insecurity. While these projects are central to the lives of constituents, extension agents and past studies have showed that political leaders prefer physical projects since they appeal to the electorates. The community members evaluated politicians' performance on the basis of what they can see and count. A participant quoted an incidence where she engaged her farmers in a talk to enlighten them on the plight of other key service delivery departments that they seldom considered during the PP forums:

> *Until farmers ask for projects (agriculture and extension) it is so hard to be supported. Most of the time [community] talk about water, water, and water. We have been telling them if you keep asking for water, water, water what about other departments? How will the other departments serve you if you do not ask for anything related to their departments? (Rita-Ward Agricultural Officer)*

Extension agents highlighted how the community and the political leaders seldom prioritised food security projects, yet the food insecurity was high in the county. A participant pinpointed the contradiction in the county development agenda to eradicate "*mwolyo*" (relief food) and the low budget allocations to agriculture and extension delivery:

> *If you go to the field and then you probe to see what the challenge that [community] have, they will tell you it is food security. But if you do not help them to come up with a project when they go for the public participation, they will only say the roads… and nothing else. Because this [food security] is a soft thing [Intangible], they do not see it in their eyes so it is somehow ignored. (Jackline-Ward Agricultural Extension)*

Local extension agents attended the public participation forums to listen, but not give opinions. Participants who attended the forums in the past termed it as a "tricky and stressful situation" as local representatives battled to be heard. The local "powerful' political leaders were also regarded as driving the development agendas in their local PP forums. An extension agent who attended the forums, and whose sub-county is highly affected by climate change, told how they gave prioritisation of projects to support farmers to adapt.

Those meetings are very political, big wigs come from Wote (county headquarters) they have their own agenda so talking about climate change is not part of their agenda. (Kingston- Sub-County Agricultural Officer)

As a way of adapting to the emerging resource challenges with a devolved system of governance, extension agents devised strategies to indirectly influence the choice of projects, yet also ensure their needs are heard and considered by the county leadership. Most extension agents expressed how it was inevitable for them to find ways of pushing for resource allocation. Some feared that without such 'aggressiveness' towards resource mobilization, extension services 'will die' and farmers who depend on public extension services would suffer.

5.9.2 First deal with the challenge of farmers not attending PP forums

Extension agents and other agencies working with communities in Makueni had a general opinion that members of the local community are reluctant to attend the public forums. As a result, they miss the opportunity to contribute towards prioritizing initiatives that are vital for their livelihood. An extension agent and an officer in charge of drought response, reported to constantly encourage farmers to attend these public participation forums while, at the same time, coaching them on type of agricultural projects to request for:

We coach them and change their attitude about going to these forums because not unless they go there and ask there cannot be money for extension (Lydia-Ward Agricultural Officer)

We are working towards changing the mindset of the people, that is changing how our people think. If they do not attend these forums, then how will they present their challenges and the projects they want? (Program Officer-Government Parastatal)

Extension agents, therefore, use the following strategies to draw both extensions work resources and agricultural livelihood projects for farmers.

5.9.3 Enlighten and educate farmers and 'push' farmers

One of the strategies extension agents are using is to educate farmers on the value of agriculture to their economic development. According to an extension agent whose farmers were only asking for roads and schools, enlightened farmers to ask for agricultural projects which impact on their livelihood:

We are trying to encourage and educate them. Apart from asking for roads and Early Childhood Development (ECD) centers they should ask for things that can earn them something directly for themselves. Like this fiscal year 2019/2020 farmers requested and were given KSH. 2 million for agricultural projects. One million for mango seedlings and one for poultry. (Lydia-Ward Agricultural officer)

Besides educating farmers to ask for specific agricultural projects, some extension agents reported to coach farmers on 'big" agricultural projects to ask from the county government. An extension agent whose farmers asked for one-day-old chicks who experienced a high mortality rate as they were delivered, coached her farmers to ask for incubators to hatch their own eggs locally. In her opinion, incubators would empower farmers to sustain their poultry business by continuously hatching their own eggs.

Because for us as staff we cannot ask anything, we told them that they should ask for something big. From Ksh. 33 million set aside for agriculture project they should ask for more money to buy their own incubator for hatching chicks locally to avoid transporting chicks from far places and avoid high mortality due to that. (Lydia-Ward Agricultural officer)

Conservation agriculture (CA) is one of the perceived successful climate-smart technologies in the county. Extension agents explained how they are capitalizing on the perceived success and the acceptance of the CA technology to lobby for machinery from the county. An extension agent working in a ward where farmers have accepted and effectively adopted conservation agriculture, explained how she pushed her farmers to prioritize machinery in their ward budget.

We trained farmers on CA and farmers saw its importance and those who picked the technology are doing well. I mobilised farmers through public participation to demand a tractor with a ripper, and we got one. My ward was the first one to have a ripper. (Evelyne-Ward Agricultural Officer)

Occasionally, the county government has initiatives that respond to emergencies such as droughts and floods.

I was given the fuel I am using by the county offices to dry beans for storage in the sub-county warehouse. I was told to collect fuel

specifically for these activities, but I was left with a balance. I am now using the same fuel balance to run up and down to do other extension activities. If the balance is over and if there will be no communication from the headquarters, I will just dig into my pocket and fuel the motorbike. If there is some extension work, I need to attend to, then I fuel the motorbike and go. (Josephat-Ward Agricultural Officer)

NGOs and donor projects increased the resource pool from which extension agents reported to draw to carry out extension work. However, NGOs and donor projects were available in some wards. According to extension agents, wards that receive a significant amount of rainfall are regarded as of high potential and, therefore, least allocated donor projects compared to arid and semi-arid areas. Most NGOs concentrated their activities in the 'dry' wards as reported by participants. Such management decisions impacted on resource availability for extension agents working in those wards as mentioned by interviewed extension agents. The following section illustrates how extension agents lever off resources from donor projects and NGOs to meet farmers' needs.

5.9.4 **Resourcing from donor projects**

Extension agents were tasked with the responsibility of training farmer groups funded by the projects and, therefore, they oversee the organisation of training logistics such as inviting farmers and arranging for training venues. However, the opportunity to train the project groups opened a window for the extension agents to fulfil their other extension duties. For instance, an extension agent tasked with training the KCEP-CRAL project groups shared how he circumnavigated the project directives to ensure more farmers attend trainings. In the following vignette, the extension agents describes how he went about inviting non-project beneficiaries to attend a training that was intended only for the project group members.

This is what I do, when an organization tells me to go and train farmers, I have that time to mobilise them in terms of giving them the days to train. So, what I do is that I also tell them the training is not for group members but for all community members since they are all farmers. They are your neighbours too. So, I call them [non-group members] and tell them whoever wants to be trained to come to the training. That is what I do. I encourage others to attend. Like recently, I was assigned to train a farmer group in Kisau Kiteta although it is

not in my ward. I was given the contact of the chairlady and I told her that I was not going to train their members only and therefore she should instead pass the invitation to other community members and neighbours. In other words, any farmer who wants to be trained should get the information to utilise in their farms. When I went [to the training venue] more non- group members had attended the training than the Bonafede group members. There was no extra cost involved in training the extra 50 farmers. …. The goal of extension services is to reach more farmers. And in this case, we have reached more households than what we were targeting. (Shadrack-Ward Agricultural officer)

The vignette outlined how extension agents turn potential resources into resource-in-use to accomplish their plans. It also depicted the everyday dynamics extension agents experience as they endeavour to reach more farmers in a resource-constrained environment. In this case, the participant wanted to reach and disseminate knowledge to many farmers, since the information was not unique to the group, but universal to all farmers. The extension agent felt that it did not cost the project any extra to accommodate more farmers and, therefore, bypassed the project directives.

Extension agents further reported to use resources allocated by projects to visit and address farmers' needs. The following was quoted by two participants who used resources provided by projects to reach and train farmer groups to respond to the needs of other farmers along the way:

…this is what I do, I use resources from stakeholders (projects) to reach other non-targeted farmers. When I am traveling to meet farmers, I am given fuel or funds to train farmer groups that are more than 10kms away. So, as I travel along the way there are farmers who need my services. If there is a farmer who needs to see me, I will leave home a bit early so that I pass by my farmer's farm, I see him then I go to where I am supposed to train. So, I killed two birds with one stone. (Shadrack-Ward Agricultural Officer)

5.9.5 **Resourcing from NGOs**

According to most participants, extension services are poorly resourced and, therefore, they leverage off resources from collaborating NGOs to achieve their work set targets. An extension agent shared how he adopted 'an open door' strategy to invite agencies

willing to collaborate with them in delivering extension services. An extension agent working in the dry areas highlighted that he valued NGOs for the services they rendered to the community and for granting a lifeline to the resource-deprived public extension sector. Two participants viewed their relationship with NGOs as symbiotic since both agencies gained from each other.

> *We in extension service is like we are "just like this (gesturing with open hands) waiting for anybody who will come with resources I will work with him. Because [NGOs] are using us. So, once we go to the field with them, we feel we have achieved. If we work with them, we achieve for the Ministry they achieve also. They complement us, they assist us, they facilitate us to do our work. (Rita-Ward Agribusiness Officer)*

> *One good thing about [extension work] is that since we are collaborating with these NGOs…once they come to our area, we link with them. That is how we get moving. For example, if you are doing a demonstration, they facilitate you. This makes our work better or doable. When they come with transport, we use theirs. When we go to demonstrate to farmers together, they pass on their technology, as we also pass on our extension messages. (Robert-Ward Agribusiness Officer)*

Extension agents working in wards with an NGO presence highlighted that they have created personal relationship with these agencies. The NGOs have formal relationships with the Department of Agriculture at the County level, however, it is the interpersonal relationships, professional experience and expertise that seem to have cemented individual ties. Participants reported that NGOs and extension agents complement each other's strength and limitations, that is, NGOs have funds, but lack expertise, whereas extension staff have expertise, but lack resources.

> *…… they [NGOs] do not have staff. They are only facilitating us to achieve for them and for ourselves. (Rita-Ward Agribusiness Officer)*

> *We do train farmers on their behalf. They do not train us…They believe that we have technical capacity, so they utilize us to train their farmer groups. (Shadrack-Ward Agribusiness Officer)*

Extension agents working in wards with NGOs, reported to offer technical support to farmer groups funded by the agencies. The NGOs reciprocate by providing resources to aid extension agents in reaching farmers and training the targeted groups. A participant working for a local NGO reported that his organisation did not restrict extension agents from reaching more farmers but was only keen on accomplishing the set work target.

> *We do not restrict [extension agents] because as they go to meet target groups they can pass through other farms and offer extension services within the area or on their way there. Sometimes we do not have restrictions in the recruitment of members since it is an ongoing process…The only restrictions we have is for the extension officer to cover what we have agreed and to cover it within the time we have agreed. These groups are for organization and order…they are even free to do other work and therefore the restrictions are about targets that we need to cover within a certain period.*
> *(Project coordinator-NGO2)*

As quoted by an extension agent from a ward with NGO projects, he utilised resources given to do project work to reach other farmers in the area. The participant reasoned that it is impossible to turn down a farmer's request for help.

> *What I can say is that [the work] we are doing is for the county even though we are being supported by NGOs. So, if I get some facilitation like fuel, as I move, I do the work for that NGO as I also do the normal extension. As I move if I find a farmer who needs assistance. I cannot tell him/her I have not been facilitated to visit you or to talk to you. I cannot say I am facilitated to see A and not B. A farmer is a farmer. (Mutembei-Ward Agricultural officer)*

> *World Vision has resilient livelihood projects. …so, they utilize our capacity to benefit the farmers knowing that we have no means (fuel) of going [to the field]. If they give us fuel and lunch, we go and train those groups. In fact, that is what has made us be more mobile…if I had no means of transport, I would have just sat in this office waiting for farmers to call and ask for services. (Shadrack-Ward Agricultural officer)*

Interviewed extension agents working in areas with NGOs shared how they were the conduit through which these agencies reach farmers and implement their project activities. While the resources provided by NGOs are made for specific activities, extension agents reported to innovate in their way they utilise them.

> *The NGOs support us with transport and lunch but rarely build our capacity…they assume that we have the content… we have gone to school (we are professionals). So, we only plan and harmonize what we know and what they want and then we do the work. (Alice-Ward Agribusiness Officer)*

Interviewed extension agents utilized resources given by the funding NGO such as fuel to visit other farmers. The World Vision program manager explained that he was aware that extension agents utilised resources given to them for multiple purposes, but he accepts his organisation also benefits from this. Extension agents reported how in their day-to-day extension work they reciprocated the NGO's support by voluntarily monitoring their projects and reporting back to the manager. Such reciprocity signifies a high-level trust and a strong relationship between the local extension agents and the NGO.

5.9.5.1 Leverage off NGOs' commitment to social welfare

According to a participant who works as a project coordinator, his organisation empowers communities to have access to water for drinking and farming to improve food insecurity. Extension agents leverage off the NGOs' commitment to social welfare, especially for marginalised communities to harness resources to support hard-working farmers. As quoted before, an extension agent tapped on an NGO's project that aimed to improve the livelihood of community to access dam liners for a youth group.

Extension agents that I interviewed gained knowledge of new technologies from local NGOs that are deemed to be networked with other agencies across the globe. For example, a participant working in a semi-arid area explained how he learned about the Zai pits' technology from the World Vision. The extension agent viewed the NGO as a 'technology catalyst' since they bring in new technologies to facilitate their dissemination.

> *We have a technology called Zai pits which are a water harvesting structure. Zai pits came with World Vision and they were introduced in Kibwezi sub-county… [NGOs] are better exposed to the bigger world than us because most of the technological interventions that*

they bring are at times foreign to us…then [we disseminate them] and farmers have accepted them. (Jacob-*Ward Agricultural Officer*)

5.9.6 **Summary**

Interviewed extension agents have demonstrated how they draw on resources embedded in their networks to facilitate their day-to-day extension activities. Extension agents have demonstrated how they build social capital trust, reciprocity, and relationships with NGOs which they later leverage off access resources to support/complement farmers effort to implement technology.

The following section describes extension agents as a mutual resource to each other and how they leverage off each other's capacity and specialty to deliver extension services.

5.10 **How extension agents support each other to address farmers' needs**

5.10.1 **Introduction**

Interviewed extension agents demonstrated how they collaborate and cooperate with each other to meet farmers' needs and those of agencies working with farmers. The staff-to-staff relationship can be rationalised as partly driven by the financial and human resource constraint within the county public services. In addition, the diverse demands by collaborating agencies and the growing numbers of farmers (households) were listed also to be driving staff collaboration. Differences have also emerged between extension staff who work alone and those who work in a team of two or more about how they cooperate with each other. Most extension agents interviewed seemed to be engaging similar strategies to counteract staff shortages and to meet diverse and multiple work demands.

As reported by participants, the county public extension services are highly understaffed and, as a result, most wards have only one staff member and, in a few wards, two extension staff members. The diminishing staff numbers was reported to be due to staff loss through retirement and the inability of the local government to employ new staff to replace those who left. Over 80% of the extension agents who I interviewed were over 55 years old and most feared that in a few years' time farmers may not access extension services since the majority will have retired. The number of households was reported to have increased and thus further constraining the provision of extension services by available staff members. As a result, some extension agents expressed hopelessness and fear that in future they will not meet farmers' demands.

.....we are incapacitated since we are only two. We were three but our colleague has just retired around 2-3 weeks ago. The other officer is retiring in 2-3 years. I will be left alone. (Josephat-Ward Agricultural Officer)

You know here the county government is not employing.... a few years ago, we had staff in every sub-location but now I am the only person in a ward. I have about 10,000 farm families to serve…. the standard ratio (extension agent; farmers) is 1:400/450 but mine is 1:10,000. Even if I were to visit a farmer every day in a year, I would not be able to reach a half of them, even if I worked over the weekend. (Mwololo – Ward Agricultural Officer)

However, the situation in the Livestock Department appeared more dire than that of the Agriculture Department. According to a livestock extension agent who regards himself as the youngest in the Livestock and Veterinary Department, is hard hit by staff shortage.

I am the youngest and I am 46 years old… the other [livestock officers] may be gone by 2022 and if they retire, we will only have five officers working in the whole county (30 wards) …. In Makueni sub-county we only have three livestock officers. Two of us are managing five wards while one officer oversees the lower wards Mbitini and Matiliku. (Mwatu – Livestock Ward Officer)

5.10.2 How extension agents accomplish their duties with limited human resources

The National Agricultural Extension Policy lists five technical areas that dictate extension staff deployment at any level of administration. These are crops, agribusiness, land and environment, home economics and livestock production departments. Interviewed extension agents reported that due to staff shortages they looked after two or more technical areas. As quoted, participants working in a ward with two staff reported to organise work by sharing the duties between themselves to ensure farmers get services.

In this ward we are two staff; I am the Ward Agricultural Officer, I am also the Crops Officer and the Agribusiness Officer. My counterpart is the Environment and Land Development Officer. We multi-task. We are performing all these duties. (Josephat-Ward Agricultural Officer)

We are only two in the agriculture department and one staff in the livestock department. The other staff concentrates on livestock production issues while I concentrate on Agronomy and Home Economics. (Lydia – Ward Agricultural Officer)

In wards with two extension staff members, participants reported to jointly plan for resources and share time, funds, and transport as a strategy to achieve more with limited resources. A participant working in a ward with two staff reported a joint plan and prioritised activities that were urgent and ensure resources are directed to that.

Over 80% of the time we work as a team; we sit down we look at the work plan and the resources. We sit down and we agree on when each officer is starting his work. But there are times when we receive resources but there are activities which are of more essence more urgent than how we planned. (David-Ward Agricultural Officer)

The results show that participants shared work according to their areas of specialization whenever they held outreach activities such as field days. However, whenever activities ran concurrently, the participant split work sites to accomplish more extension work. As highlighted in the quote, the extension agent and his counterpart split their work schedules to take advantage of forums and organised local chiefs to reach many farmers and pass on extension messages.

We are doing soil and water conservation training to farmers and last week we organised two barazas through the chief.... I attended one and my colleague attended the other. We divide the job according to the capacity which is available. (Josephat-Ward Agricultural Officer)

Interviewed extension agents shared available transport resources to reach farmers and supported each other to perform their duties. A female extension agent, reported to be supported by a male staff member, rode a field motorbike when visiting farmers and performing field activities.

If we have one activity, then we do it together but if we have two activities running concurrently, he attends one and then I attend the other. We use one motorbike; I drop him at the venue then I proceed to mine. (Josephat-Ward Agricultural Officer)

.. in our ward we have one motorbike but even if it is there, I will not use it since the motorbike is not lady-friendly. We have a male officer

who is the rider…. So we support each other by sharing things like the motorcycle. We play teamwork with each other. (Gladys-Ward Agricultural Officer)

While some extension agents in wards with two staff reported to share technical responsibilities between themselves, others preferred to share work along administrative boundaries to ease day-to-day operations. According to an extension agent working in a ward covering a vast area, together with her colleague they consented to work within certain boundaries to ease service delivery.

We have job descriptions [duties], but we are few. To manage work, we have divided the ward into two. We have used the Mombasa-Nairobi highway as the demarcation. My colleague oversees the lower part and I attend to farmers on the upper side. So, we do everything that involves agriculture: crops, agribusiness, nutrition. So, I do everything to make [farmers] happy. (Evelyn-Ward Agricultural Officer)

In wards with only one staff member, participants described themselves as "everything" as they solely addressed diverse demands of farmers and those by collaborating agencies. Two ward extension agents deployed alone quoted how they chose to take up all responsibilities as a strategy to deliver on most of the duties prescribed to a Ward Agricultural Office.

I am here alone in the whole ward, and therefore I do anything and everything that pertains to extension. It ranges from Crops Development, Horticulture Development Land Development, and projects. Everything. (Maurice – Ward Agricultural Officer)

Currently I am working alone but previously I was working with another staff but due to challenges of staffing in the Ministry he has been transferred to another ward. So, I am handling 3 dockets, Land and Environment Development, Crop Directorate and Agribusiness. So, I am dealing with everything. (Abel– Ward Agricultural Officer)

A participant working in similar circumstances tapped on her planning skills to organise her outreach activities to ensure all the demands farmers are attended to. She reported using her personal car for transport to enhance her mobility to carry out multiple activities and achieve more in a day.

...If all people want attention you have to plan your time. …I plan my work because I do not want to disappoint someone. I have a weekly plan because I have several sub-locations, locations and villages and somehow, I must reach to all corners. You must mix things here and here and combine activities when possible. (Gladys-Ward Agricultural Officer)

A livestock extension agent, deployed to work in three wards, used self-organisation strategies such as weekly planning to schedule farmers' appointments and meet their needs. The participant reported to operate a 'mobile office' since the situation demanded him to move from one ward to another addressing farmers' demands. As quoted, the participant negotiated with farmers on a visiting schedule whenever they called to request for him to visit:

I have a program where I work in Mavindini on Monday and Friday, Muvau/Kikumini on Tuesday and Wednesday and I am in Wote on Thursday…...I write everything in my diary so that when [farmers] call me, I can refer to my records. When [farmers] call me at the same time then I must tell them if I am occupied or not. Sometimes I attend to one and I ask others to reschedule. (Mwatu – Livestock Ward Officer)

Another extension agent, working in wards shared that livestock extension agents, linked farmers demanding livestock services with the livestock staff via mobile phones.

.... the Ward Livestock Officer and the Ward Veterinary Officer are overloaded because they oversee two wards, Kilungu and Ilima. So sometimes they are in this ward and other times they are in another ward, so they keep moving. But I link them to farmers who come for their services such as vaccination. (Abel– Ward Agricultural Officer)

Sometimes we share staff like now the livestock officer is based in Ukia ward and he is supposed to handle cases here (Kaiti) also. When the livestock issue is brought up [by farmers] we call him and we ensure the farmer has his contact so that they can communicate. (Alice-Ward Agribusiness Officer)

Extension agents prioritised farmers' needs when planning work as they believed citizens (*mwene nthi*) are the main clients of public service. An extension agent from a ward with multiple projects and NGOs, reported prioritising first his farmers, then later

accommodating the needs of other stakeholders since they are of value for delivering extension services to farmers.

> *What we do, we write weekly work plan at times months, at times quarterly, but the truth is we give priority first to the farmer because here they call them "Mwene Nthi" (owners of the land/citizens). Second, we give priority to our employer and then the non-state (NGOs, Private) organisations. (David-Ward Agricultural Officer)*

The strategy of farmer organisation to reach many farmers and disseminate extension services was reported by most interviewed extension agents despite the differences in staff establishment.

Most extension agents work with groups of farmers rather than individuals and cover multiple topics at any event as a strategy to optimise extension efforts. In the following quote, extension agents constrained by low staff numbers, preferred to work with farmer groups:

> *…In the implementation of activities, we mostly target the groups because now it is impossible to visit each farmer individually. We target self-help groups, Community Based Organisations (CBOs) to pass extension messages. That is now the easiest way to pass messages to farmers by targeting a group to reach more farmers at once. (Oscar – Ward Agricultural Officer)*

> *… In most cases we deal with groups so that we can meet with a big number of farmers at once. Because it is impossible to move from one household to another. (Lydia– Ward Agricultural Officer)*

Interviewed extension agents reported carrying out individual farmer visits as a way of responding to a farmer's private needs. As reported earlier, most agricultural and livestock extension agents are trained on general agriculture and offered a wide range of advice to individual farmers and groups. For example, an extension agent working alone in a ward reported utilising every opportunity she had with individual farmers or with groups to pass on as much information as possible. She reasoned she might not have the opportunity to return to the same farmer or group again and pass more information.

> *..... Just plan and make sure that everything (all information)] is on the ground. If it is about agribusiness, about marketing …. If it is*

about nutrition, you tell farmers what they should do. So, when you go for a training or meeting you combine as many impact points as possible to cover all those things at once. (Lydia– Ward Agricultural Officer)

Another participant reported to mainstream topics on adaptation to climate change whenever she met farmers, since it cut across all farming activities. As reported by the participant who works as a livestock officer, they viewed teaching farmers about climate change as the responsibility of every extension agent despite their job deployment.

.... when I visit a farmer, I handle everything. If I see something a farmer can do something about like, for example, climate change, I talk about it and in groups I do the same. I include climate change on top of what I have planned with farmers. So, we talk about it everywhere we go. It does not matter your deployment. (Mwatu-Livestock Ward officer)

5.10.3 **Staff to staff referrals**

Whenever a farmer's need was beyond the extension agents' technical capacity, participants referred or linked that farmer to staff with a speciality in that area to ensure the farmer's issues were addressed. Participants working in wards with few extensions officers explained how they handle farmers' demands that behold their knowledge.

When we visit a farmer, we handle all those areas where we can advise. But where we are not able, we work in consultation with the relevant officers. We inform the officer responsible that "we have [livestock] case and this farmer [has this problem]" and [the livestock staff] will plan when to visit and advise. So, we work in co-operation because we do not have all the subject matter specialists in our office. (Alice-Ward Agribusiness Officer)

Yes, sometimes if farmers come to the office and they want information on livestock, I do advise them if the problem is beyond my capacity, for example, de-worming, I refer them to the officer in charge, because he is the specialist. (Gladys-Ward Agribusiness Officer)

Farming issues such as livestock health and vaccination were referred to either the local veterinary officer or the livestock extension agents. As described earlier, livestock extension agents are few and, therefore, serve in multiple wards. As quoted by an extension agent working in a ward which shares a livestock extension agent, whenever a farmer visited to ask for livestock-related services, the participant linked the farmer to the officer to ensure his/her demands were addressed:

> *...we are sharing staff like now the livestock officer is based in Ukia ward, but he is also in charge of our [Kee ward]. So, when livestock issue is brought, we call him, and we also give the farmer his contact so that they can communicate. (Alice-Ward Agribusiness Officer)*

> *When it comes to farmers asking for livestock advice even though I did some dairy management in college, but that is not enough. So, I help them to go to the livestock officer who will help them. (Jackline – Ward Agricultural Officer)*

In situations where an extension agent could not physically meet a farmer, most participants reported advising farmers over the phone. Extension agents interviewed shared a belief that modern information and communication technology such as phones enabled them to reach farmers and pass messages at the least cost possible. However, they noted that not all extension issues can be addressed via the phone as the participant explains:

> *.... these phones help a lot...you know I cover a bigger area. Unlike in the past when a farmer would walk to the officer and then you walk back with him that was very difficult. Nowadays phones are making us cover the expected work. We can manage with a shortage of staff. (Ruth-Ward Agricultural Officer)*

An extension agent who works at the sub-county offices and who reported having access to a library and online farming materials, reported sharing agricultural materials mostly with literate farmers:

> *We are few. We are only two in these offices, and we cannot meet all farmers' demands so we link them to all these sources of information including mobile phones…. I have access to good literature so when I come across some good material I photocopy and share with [farmers]. (Kingston – Subcounty Ward Agricultural Officer)*

5.10.4 **Use synergies and combine energies with other departments**

Extension agents reported to build rapport with local administrators and other government agencies since issues such as climate change and food security were deemed to cut across government departments. A participant reported to utilise barazas organised by these agencies to reach and pass messages to community members (farmers). Extension agents reported asking the local administrators (chiefs) to disseminate extension messages that they deemed important to the community whenever they convened barazas.

> *Since now I am alone, I need to have support from the other ministries. The chiefs, the Ward administrators and the departments that are close to us such as water, environment are aware of my work. We work hand in hand because the effects (climate change) are felt across the sectors. Together we have been sending this message. So, once they have a meeting...even when I am not there, they pass the message. (Emma-Ward Agricultural Officer)*

A participant quoted teaming up with staff from other government agencies and support each other in implementing activities. The participants reported using their forums to pass extension information to community members.

> *We (extension agents and other government departments) use synergies, we combine energies with other departments. For example, when there is nothing for the extension department and may be the Devolution Department is doing public participation, because they call us [extension agents] to assist in gathering views from farmers. …so [extension agents] use the same forums to reach farmers and tell them what we have. (Benson-Ward Agribusiness Officer)*

While most extension agents outlined the many strategies, they used to ensure farmers' issues are addressed, in some exceptional circumstances, some participants chose not to attend to some farmers' needs. For example, an extension agent working in an area where farmers' conflicts associated with crop damages are prevalent, shared an opinion that sometimes the conflicts were linked to family issues. He, therefore, first evaluated the nature of conflict before making a choice to respond or not. If the conflict related to family land or resources the extension agent referred the issue to the local chief who is mandated to handle such. In conflicts regarding crop

damage by livestock, extension agents reported arbitrating by bringing together the two farmers and negotiating for an amicable solution.

> *There is also something that is notorious here, crop damage assessment. In a day you can have up to five complaints when you get those complaints, I first interview to see the weight because some are just domestic issues. Some you address and others you do not attend. (Josephat-Ward Agricultural Officer)*

5.10.5 How extension agents work with NGOs

Extension agents from wards with NGOs reported implementing project activities on behalf of these organisations. As reported by participants from NGOs, they lacked expertise, therefore, relied on local extension agents to implement programs on food security and livelihoods. Most NGO activities involved farmer trainings and, therefore, required the physical presence of the extension agent. As a strategy to accommodate the NGOs demands in their day-to-day schedules, extension agents who trained these farmer groups reported planning and negotiating with the agencies on when to carry out the activity.

> *Sometimes when I am needed by collaborators, what I do is that I remind my collaborators that they should inform me two days before the activity day so that I can prepare. Sometimes we tell them to reschedule the activity, or I plan to carry out activities in one area in the morning and then the other one in the afternoon. Sometimes it is about the time so we arrange activities around that. (Mwatu-Ward livestock Officer)*

Whenever a staff member was unable to implement the activity as planned, a participant from a local NGO reported relying on the responsible person to arrange for another staff member to carry out the work. A livestock extension agent also reported requesting his fellow staff to attend to farmers on his behalf whenever he was unable to.

> *……. we plan with them [extension agents] what we want done and they share with us their calendar. But in case one is busy and cannot do the work they can talk to another extension officer from the neighbouring wards to come in. …. we rely upon such a staff who is supposed to do the work to give us a replacement. (Staff-NGO1)*

I have my counterpart who in charge of Kithuki/Kitise and Kathonzweni ward. I may call him and if he is free then I tell him go attend to such and such a farmer. He can go and act on my behalf. (Mwatu – Ward livestock Officer)

One extension agent deployed alone in a ward advised that his deployment to a specific ward, did not deter him from supporting other staff. As quoted, the extension agent enlisted each other's support when holding major outreach activities such as field days:

When we have activities like field days, we invite one another. We are not just working alone; we do not 100% belong to the offices where we are deployed. We are free to help one another. So, we can enlist the help of other staff and support each other. (Jacob-*Ward Agricultural Officer*)

In my ward when I have activities that are demanding…… I can manage to call somebody from the neighbouring wards and assist each other not unless the activities are running simultaneously. So, we collaborate as officers may be from Kathonzweni or Muvau or Kitise. (Benson-Ward Agribusiness Officer)

Another interviewed extension agent preferred to consider individual staff's speciality when enlisting for help from others to carry out outreach activities.

Last week we had a field day in the neighbouring ward Mavindini, and [field extension] were [drawn] from all over the County. Whenever we go to these field days my [section] is always on orchard management and I teach about canopy management because that is my speciality. (David-Ward Agricultural Officer)

Extension agents reported having a reciprocal relationship with fellow staff and motivated staff to support each other in delivering extension services to farmers.

If it is work that requires more than one person normally, we import (staff from other wards). I go to the other ward; I ask them "we have this training coming do you want to help me?" So, if they say yes then I share with them the topics to teach. In future if they ask for my help I will help them too. (Shadrack-Ward Agricultural Officer)

Extension agents reported sharing and exchanging information to ensure that they kept abreast with farming issues. Participants reported using mobile phone applications such as WhatsApp to keep project teams and other collaborators updated about farmers' activities. A local NGO program manager shared how extension staff kept him informed by sending photos of farmers' activities via WhatsApp. Extension agents also reported using the same platform to share with relevant extension information with fellow staff in the county.

We support each other by exchanging current information through WhatsApp. We play teamwork with each other. (Gladys-Ward Agricultural Officer)

5.10.6 **Conclusion**

The key points that emerged from the results include:

- Extensionists viewed their job as a calling and sacrifice personal resources to meet farmers needs and to meet demands by the government, donors and NGOS.
- Extensionists employ their competencies to address emerging and existing needs of farmers, and they work to support farmers to transition to more adaptable livelihoods.
- Extensionists use multiple strategies to mobilise, influence and persuade farmers to take up either new technologies or older practices which they deemed appropriate. They utilise their experiences to shape farmers' decisions about their choice of livelihood.
- Extensionists rely on their networks with other extension actors for various resources. The results show that extensionists tap a wide variety of financial and material resources to support poor farmers and to support their day-to-day work.
- Extensionists work with farmers and local leaders to influence institutional processes such as public participation to access resources from the county government.
- Project delivery has emerged as an important role extensionists play and they work with farmers to achieve the desired outputs and outcomes.
- Extensionists have relationships with farmers and other extension actors within and outside the county with whom they work with to deliver on their mandates.
- The context within which extensionists work has emerged as powerfully shaping how they do their day-to-day extension work.

CHAPTER 6 DISCUSSION CHAPTER

6.1 Introduction

This doctoral research sought to answer the question: What do extension agents do and how do they do what they do and why? What shapes how they do what they do? The research study was conducted in Makueni County in Kenya. Public extension agents working at the ward administrative level were the primary study participants. Other research participants were drawn from organisations that were mentioned by the extension agents as closely collaborating in delivering extension services to farmers in Makueni County. The study applied a single case study design and data was collected through interviews, participant observations, and secondary document review. The research focuses on the working lives of individual extensionist and makes explicit how they fulfil their roles as extensionists. The study challenges the view of extensionists as simply transferring technologies to farmers and explores more broadly what and how extension agents do, and what shapes how they do what they do. This study looks at Kenyan extensionists' day-to-day work and the multiple roles fulfilled through this work. This approach is unlike most other studies that tend to focus on one or more roles fulfilled by, or contributed to, by extensionists in the extension system. The roles of extensionists go beyond any job description conveyed in government documents or what is articulated in most extension literature. The study draws on extensionists' practical experiences and understanding about how they navigate context-specific situations to deliver services to farmers. The study findings add knowledge and understanding to extension practice in the context of the developing world where public extension services dominate.

6.2 Defining the characteristics of the case

The Kenyan Government and its extension staff are the predominant extension service providers for smallholder farmers in the Makueni County and beyond and an important driver of rural development. Under the county management, extensionists working at the ward level are required to align with National and County development goals to achieve food security, improve rural livelihoods, eradicate poverty, and support climate change adaptation. The public extensionists serve smallholder subsistence farmers who engage in diverse farming activities and are dispersed across a large geographical area. Extensionists are highly dependent on agricultural projects supported by donors and multilateral agencies. It emerged from the study that the county and donors mostly funded agricultural projects and NGOs projects were implemented in the wards within

the arid and semi-arid parts of the county. The Government regarded the hilly masses as having high potential, however, lacked the NGOs' presence and had few government projects, if any.

From a broader context, it emerged that over the last nine years, extensionists had grappled with the institutional and structural changes which positioned farmers as playing a role in resource planning, budgeting, and prioritisation of development needs in the county. Extensionists were no longer involved in setting budget priorities as they used to do before the decentralised government. Even though that was not regarded by extensionists as impacting on farmer-extensionists relations it shapes and forms part of the understanding how extensionists work now.

6.3 **Who are the extensionists?**

The extensionists in this study are public extensionists working in a challenging environment of resource scarcity, structural changes, poor subsistence farmers worsened by climate change. Twenty-one out of the twenty-six interviewed extensionists had been in service for over 20 years and the other five had worked for over ten years. All extensionists had served in multiple areas within Makueni county and 50% of them had, at least at some point, worked outside of the county. Over 80% of them were locals, hence, knowledgeable of and known by the community and familiar with local livelihoods and political dynamics. Some of the extensionists had never lived or worked anywhere else other than in Makueni County and were strongly embedded in the community. Over 90% of the extensionists who participated in the study had been doing extension work for all their working lives. Over their long service, extensionists had established bonding and bridging networks with local farmers, fellow extensionists and other actors in the local extension system, who they met during their careers and with whom they have maintained contact (some of whom no longer live in the area). Some of the actors are non-governmental agencies such as the World Vision who have been in the county for over 40 years and, even though staff change in those organisations, the relationship between the extensionists and the NGO are maintained through referrals from departing staff to new staff. Extensionists' networks included Agro-input marketing staff and companies, individual scientists from public and private research organisation and universities, community-based organisations, and farmer groups. Extensionists maintained contact with individual actors, and they reached out to them when they needed their help.

This research broadens the understanding of how extensionists do what they do by providing richness and detailed account of how, why and what shapes how they do

what they do. Most of the literature on extensionists tends to explore only one aspect of what extensionists do, however, this research demonstrates the interconnectedness of what they do and the synergies and complementarities that exist and shape extensionists' work.

6.4 What extensionists do

What emerged from this research study in relation to the context is that:

1. Primarily in their day-to-day work, extensionists service smallholder farmers' novel and existing needs and gather solutions from multiple sources to contribute to addressing these needs.
2. Extensionists are resource brokers who glean, leverage, optimise, haggle, barter, piggyback, coach, lobby, advocate for financial and physical resources to support their extension work.
3. Extensionists negotiate and collaborate with farmers to translate, adapt, transfer, and implement farm technologies to meet farmers' contextual challenges.
4. Extensionists deliver on multiple projects and optimise project benefits for farmers within the project timeline.
5. Extensionists deliver on employment commitments as government employees and work to meet their expected Key Performance Indicators (KPIs).
6. Extensionists maintain and build legitimacy in their roles with government, local politicians, NGOs, and the wider community.

The six elements identified above are not done in isolation of each other but comprise a totality of activities and interactions undertaken by extensionists in their day-to day-work. Elements numbers one, three, four, and five are evident in the body of literature that show extensionists' service needs of smallholder farmers and deliver on their job roles (Chimoita et al., 2017; Makate & Makate, 2018; Munthali et al., 2021 ; Vrain & Lovett, 2016). In this research, extensionists respond to direct inquiries from farmers, but the majority of their work is to supply services to farmers through projects. Servicing farmers is enabled through resource-brokering and project work which mainly involves technology transfer work, both directly with farmers and with other actors in the extension and development system in the area. Elements two and six are unique to this study and not reported in other extension literature. Extensionists directed a significant amount of effort and illustrated diverse skills in the work they do as resource

brokers to fully resource financially and physically their work with and for farmers, a point highlighted in this research for the first time. In addition, the Kenyan extensionists studied, and invested time and effort to maintain and build legitimacy in their role with government, local political leaders, and the wider community. The imperative for legitimacy reflects the changes that have occurred in the prioritization and funding of extension work in Kenya and the slow demise of support for government-funded extension services.

This research highlights the extent to which much of what extensionists do in a developing country context in a government extension service, dominated by project, is not directly working with farmers to service their needs. Labarthe and Laurent's concept of front-office and back-office distinguishes the work that extensionists do with farmers and the work they do "behind the scenes" as referred by Klerkx and Peter (2012, p. 221) to support and enable their front office work with farmers. The work of extensionists, as established in this study, does not only involve working with farmers (front-office) but includes a significant number of back-office activities. This has been recognised by other scholars, for example, Petit et al. (2011) estimated that public extensionists spend between 60-80% of their time engaging in back-office activities. Back-office activities, as depicted by Labarthe and Laurent (2013), entail Research and Development activities, bringing together research and actors in the advisory industry and capacity-building of farmers. The work of these authors was based on a developed country context where extension is largely privatised, farmers engage in commercial agriculture and farming is highly research and development-driven. However, in this study, extension services are public, non-commercial, with limited R&D links and serve primarily subsistence farmers challenged by poverty, food insecurity and climate change. Activities that extensionists engaged in with farmers (front-office) were found to feed back-office activities, while back-office activities enhanced the extensionists' ability to service farmers' needs. Studies in both developed and developing countries (Eastwood, Klerkx, & Nettle, 2017; Munthali et al., 2021) acknowledge the link between so-called front-office and back-office activities.

This discussion chapter is structured around the key elements comprising the work of extensionists and the interconnections across the elements. The servicing of farmer needs is central to much of what extensionists do in their work and combines with technology transfer and project work as well as their role as resource brokers. These areas structure the main part of the discussion. However, before delving into the elements of extensionists work, the overall approach of extensionists and how they position themselves and are positioned in relation to farmers, are discussed. This

positioning and their approach to extension activities with farmers shaped and underlines how they undertake the elements of their work.

6.5 Conceptualizing extensionists' role as patronage and farmers as beneficiaries

In this study, the role of extensionists can be conceptualised as aligning with the traditional extension roles, that is, technology disseminators, change agents (Rogers, 1995), and as field level government agents delivering on agricultural policies and working to change farmers' behaviour (Friederichsen et al., 2013; van den Ban, 1999). The influence of the context within which extensionists work is stark, particularly when consideration is given to differences between the developed country, poor subsistence farmers' context and that which exists in many developed countries with commercial farmers and privatised or a mix of privatised and public extension services.

The following quote is the response by an extensionist in this research to a question posed by the researcher about how extensionists work with farmers:

> *Sometimes you are forced to use your own resources, because you must assist the farmers to come up; they have no alternative because you cannot tell them to pay. They are not able (Robert-Ward Agricultural Officer).*

As expressed in the quote, extensionists regarded themselves as highly depended upon by farmers, and described farmers as lacking the means and opportunity to access services from anyone but them. Extensionists are reflected as doing everything they possibly can to respond to farmers' needs within the structures that frame their work, including the formal institutions of projects and work-associated accountabilities and the informal accountabilities that come from being an extensionist living and working with poor smallholder farmers who seek their help. The nature of the extensionist-farmer relationship in this study can be described as one of patronage. Extensionists occupy a position of power and influence as providers of solutions and hope to farmers, and farmers are positioned as beneficiaries of this work. In this study, the extensionists are government employees and their role are afforded a degree of respect and authority by farmers which translates into a willingness to seek, listen to and follow advice given by extensionists. Likewise, the approach of extensionists to farmers tended to be one in which extensionists told farmers what to do, rather than working in partnership with farmers to co-create solutions to their problems, as reported to be the case in some developed country contexts with privatised advisory services

(Labarthe & Laurent, 2013) and Kuehne and LLewellyn (2017). Agronomists were afforded a degree of power by farmers because of their specialist expertise. In Ingram's (2018) research in the United Kingdom, they also told farmers what to do, and this expert advice was sought by farmers. The extreme contrast between farmer circumstances in Kenya and the dominance of the development /aid culture associated with extension work, compared to that for farmers in developed countries, cannot be ignored as influencing this relative positioning.

Extensionist-farmer relationships shaped how the extensionists interacted with and worked with and for farmers. The literature identifies different forms of extensionist-farmer relationships based on power dynamics between the two, for example, extensionists as expert (e.g. agronomists) (Ingram, 2008), expert to experts (Proctor, Donaldson, Phillipson, & Lowe, 2012) and as a form of partnership (Labarthe & Laurent, 2013). In this study, the power of the extensionists was embodied in the perceived status afforded the role by farmers and the patron-like approach taken by extensionists with farmers. Extensionists were contacted for advice by farmers on issues relating to agricultural production as well as marketing, input access and use, while extensionists did cover a wide range of subject areas, in large part due to the limited number of staff present in extension offices in the area. The extensionists utilised their position to persuade and encourage farmers to change practices or make decisions consistent with a direction deemed desirable by the extensionist or the project. Ingram (2008) noted similar dynamics with supply-driven extension in England, however, the basis of the influence in the relationship between extensionists and farmers differed.

Extensionists were found to value the rapport they had with farmers and empathised with farmers' circumstances and challenges and put effort into responding to requests in a timely way. For instance, extensionists used their personal financial resources to fuel government motorbikes to visit poor farmers who needed help but could not afford to pay a private service provider, for example, a veterinary officer. Extensionists in this study have lived and worked in the community for many years and, therefore, were well known by farmers. Some of the extensionists were born in and belonged to the community and farmers looked up to them for advice on issues beyond farming. For instance, an extensionist reported that whenever she visited a household the farmer asked for advice on family issues, including the choice of colleges for their children. This partly reflected the findings of a study in Kenya that showed public extensionists were integrated in villages in which they work such that farmers considered them as a friend first, then extensionists second (Mwamakimbula, 2014). The closeness of the

relationship considerably shaped how the extensionists worked delivering a hybrid form of demand and supply-driven extension.

6.6 A hybrid demand-supply driven extension system

The Kenyan Government identifies its extension policy as demand-driven (Government of Kenya, 2012) and extensionists in this study engage in what can be construed as demand-driven extension where they respond to direct inquiries from farmers in person or over the phone. However, the reality on the ground is one of predominantly supply-driven extension reflecting the dominance of projects framing their work. The role of the extensionists was to persuade farmers (seen as project beneficiaries) to implement activities set out under projects to achieve pre-determined outputs and, hence, desired outcomes. The development projects' activities/outputs also form part of extensionists KPIs and extensionists work to deliver on these, not only to meet their employment accountabilities, but also to legitimise their role within government and the extension system within which they operate. In this study, therefore, the extensionists' work with farmers is set against accountabilities determined by activities (outputs) formally and traditionally associated with extension work (e.g., as detailed in the case description chapter and include a number of farmers who sign up to projects and number of farm ponds excavated).

However, they were also driven by the project culture (supply-driven) that dominated the work they were funded to undertake, where they delivered services to farmers in accordance with project goals and accountabilities. The projects' goals may have been developed based on an analysis of farmers' needs, but, within projects, extensionists did not respond directly to farmers' requests for assistance. Extensionists supplied government-driven services to farmers that were considered important to achieving public goals (in this case the county government goals). For instance, extensionists promoted farm ponds in response to the governor's one-acre rule to promote food security and eradicate the local culture of dependency on relief food. Scholars argue supply-driven approach serves as an avenue for extensionists to convince farmers to accept ideas and technologies proposed by projects as noted by Landini (2015) and Turner, Landini, Percy, and Gregolin (2021). These scholars also argued from a developing country context that it is a way for government to legitimise development goals. This is the case in this study, considering that the bulk of what extensionists do is related to project work and KPIs that are linked to short-term and long term development plans such as the Kenya Vision 2030 and the Makueni County Vision 2025 (Government of Kenya, 2007; Government of Makueni County, 2016, 2018b).

6.7 **Extensionists service farmers' needs**

As in this research. servicing farmers' needs is recognised as a fundamental role of developing country public extensionists (Brown, Llewellyn, et al., 2018) but it is also evident in the literature that explores the role of advisory agents in developed countries (Dockès et al., 2018; Labarthe & Laurent, 2013; Proctor et al., 2011). In this study, smallholder farmers' needs were serviced by extensionists through the provision of information, knowledge and skills, and technologies geared to improving farmers' agricultural production, adaptation to climate change, and food security. This type of work is widely accepted as traditional work of extensionists in developing countries (Buehren et al., 2017; Mwololo et al., 2019; Turner et al., 2021) and it was found to align with the Government's agricultural and development policy on improving smallholder farmers' livelihoods. This differs from many developed countries where the focus is increasingly on both production and environmentally sustainable agriculture and advisory support to farmers (identified as clients) to respond to state policy goals and regulation (Compagnone & Simon, 2018; Dhiab, Labarthe, & Laurent, 2020; Nettle & Paine, 2009).

In servicing farmers' needs, extensionists are shown to fulfil roles that reflect the specific context within which they are working with farmers. This finding is strongly acknowledged by studies in both developed and developing countries (Hilkens, Reid, Klerkx, & Gray, 2018; Landini, 2016; Paschen, Reichelt, King, Ayre, & Nettle, 2017; Turner et al., 2021) that showed the connectedness between what extensionists do and the context within which they operate. What extensionists do in this study includes helping farmers gain access to input subsidies, markets, farm machinery and other technology, assisting them to apply for grants and loans, resolving farmer-to-farmer and farmer to wildlife conflicts, and intra-household dynamics of smallholders. This mix of work with farmers, across a wide range of needs, reflects both the relationship between extensionists and farmers, the strong development agenda of Government and other organisations in the area and the use of mechanisms such as subsidies and grants and 'free' technologies used in these projects with farmers. Turner et al. (2021)'s study in Argentina similarly showed that government policies to address problems faced by smallholder farmers significantly influenced what extensionists do and how they do their work, for instance, the use of government-mandated farmers' groups in Argentina (Turner et al., 2021) and farmer-to-farmer extension in this research.

6.7.1 **Servicing new and emerging farmers' needs**

Extensionists serviced individual smallholder farmers' new and emerging needs by first gathering information and probing more to ascertain the nature of the issue, as similarly noted in the literature (Munthali et al., 2021). For instance, extensionists responded to novel pests and diseases such as the fall army worm and *Tuta Absoluta*, which were first noted and reported by farmers. Extensionist-farmers' communication involved a back-and-forth discussion, either face-to-face or over the phone, to gather information needed to get a good understanding of the issues raised. Extensionists also individually visited farmers to directly view and or analyse and establish the needs and problems. According to extensionists, individual visits served as a way of maintaining and building a relationship with farmers, reinforcing many other studies exploring relationships between farmers and those servicing their needs (Kuehne & LLewellyn, 2017; Proctor et al., 2012). Extensionists also argued farm visits were needed to personally evaluate the problem, from their perspective, most farmers lacked the ability to diagnose some farming challenges on their own. However, other scholars reason, that extensionists' preferred method of interaction with farmers is influenced by the organisational policy as well as the extensionists' professional identity which defined their role in the context (Compagnone & Simon, 2018). This finding was also evident in this research; extensionists also recognised the value of visible activities with farmers which included individual farm visits, farmer group trainings, field trials and demonstrations. For many key actors in the extension system including the government, local politicians, and NGOs, embodied the work of extensionists. In this research, as reported by extensionists, the ideal face of a government extensionist was that of a man or woman dressed in overalls and gumboots criss-crossing the village on a government motorbike. This resonates with the traditional T&V public extensionist whose role was to visit fortnightly and provide instructions to farmers, rather than private-for-fee advisors who are conceived as discussing and partnering with their farmer clients to find solutions (Dockès et al., 2018; Labarthe & Laurent, 2013; Proctor et al., 2012). Being seen to be working as an extensionist meeting the expectations of others, added legitimacy to their role in the community and amongst key actors, affording them local political and community support. Many of these activities are very traditional extension activities and were also the predominant activities embedded within project designs in the area.

Extensionists also responded to challenges that they ascertained farmers had, for instance, an extensionist reported informing and guiding farmers to apply for a financial grant to purchase a fruit processor, when she realised that they were incurring high

post-harvest losses. Similarly, extensionists in this study guided farmers through processes of grant application and, in some circumstances, worked alongside farmers, especially those requiring technical expertise such as setting up drip-irrigation systems.

Extensionists in this study leveraged off expertise embedded in their professional and organizational networks within and outside Makueni county to service farmers' emerging and existing needs. The extensionists are shown as having strong networks among actors in the local and national extension and agricultural systems, a characteristic consistent with extensionists studied worldwide (Klerkx & Proctor, 2013; Schut et al., 2019). The networks comprised of contacts they had gained from many years of experience in extension and development, and they worked hard to maintain and retain those networks. Extensionists valued, invested, and maintained their broad networks which they used to secure reliable and up-to-date knowledge, as also reported by Labarthe and Laurent (2013) and Klerkx and Proctor (2013) in privatised extension services in the context of a developed country. The work of drawing on networks for knowledge is acknowledged in the extension literature and is constituted as knowledge-brokering (Proctor et al., 2011).

Extensionists liaised with subject-matter specialists and fellow extensionists and consulted scientists and experts within their networks about new and emerging farmers' needs. Extensionists consulted in-person and through social media with fellow field extensionists and subject matter specialists at the sub-county and county level. Similar findings were noted by Munthali et al. (2021) study of public extensionists in Ghana who drew on modern Information Communication and Technology (ICT) to improve

front-office services delivered. Extensionists reliance on cooperation with other actors and their peer-to-peer networks for knowledge access and to address issues of public interest, was similarly highlighted by other studies (Cofré-Bravo, Klerkx, & Engler, 2019; Compagnone & Simon, 2018; Phillipson et al., 2016). Issues reported by farmers, such as migratory pests, are considered a public issue, thus requiring collective action. Extensionists utilised ICT platforms (Mobile WhatsApp groups) to access up-to-date and research-backed solutions to relay to farmers. Extensionists shared expertise and collaborated with NGOs in their areas. For example, an extensionist reported that he trained the staff of a local NGO in orchard management and in return he learned new farmer facilitation skills. The nature of relationships was mutually beneficial to both and similar to Compagnone and Simon (2018) description of a co-operative relationship. Extensionists relied on other extension system actors to

strengthen expertise to address farmers' needs and achieve a common goal which generally aligned with government policy.

Furthermore, extensionists also worked to support new extension actors build their legitimacy with farmers and local communities. Extensionists leveraged on their legitimacy as government officers and their established relationship with farmers and local government administrators to connect new extension actors to the local community and further ensure farmers received help from these organisations. However, not all new extension and development actors sought the support of extensionists to do their work. Extensionists in this study regarded themselves as gatekeepers, as argued by Kilelu et al. (2011), who guarded their farmers from projects and actors who they felt did not have farmers' best interests at heart. For instance, an extensionist shared how an individual working as an input-seller conned farmers into buying "highly yielding and certified" pumpkin seeds which never germinated. Extensionists interrogated new actors in the local agricultural system to ascertain their credibility and 'watched over' their activities with farmers.

6.8 Servicing farmer needs through project work

Delivering on project outputs was a major component of the work of extensionists in this research which reflected the predominant frame through which extension work was funded and organized. Extensionists undertook a lot of work within the scope of the project to ensure that the benefits of projects were able to be accessed by as many farmers as possible, and to ensure the projects were targeted to those farmers whose needs best matched what the project delivered. This work included front-office and a large amount of back-office activity. As part of front-office activities extensionists mobilised farmers, articulated project demands and facilitated the implementation of project activities with farmers, as reported by other scholars (Friederichsen et al., 2013; Parkinson, 2009) to optimize farmer benefits and achieve project outcomes as part of their KPIs. Extensionists worked to ensure adequate numbers of farmers participated in project activities and used farmers and their leaders to mobilise other farmers to attend project meetings and sign-up to access project benefits.

Behind-the-scenes when they faced reluctance from farmers to participate in project activities, extensionists worked with local leaders with cultural and political authority to mobilise and persuade farmers to participate. This is consistent with other studies in Africa which showed extensionists established relationships with local authorities such as chiefs, village elders and church leaders to mobilise and influence farmers to adopt

technology, for example CA. As in other African contexts such as Uganda (Parkinson, 2009) and Zambia (Nyanga, 2012) farmer reluctance was experienced when the benefits afforded farmers through the project did not match farmers' expectations based on their previous experience in projects. An example in this research was when farmers were required to take out a loan to receive inputs through the project rather than receiving them for free. As a result, extensionists pleaded with reluctant farmers and worked with local leaders to mobilise and persuade farmers to participate in the project.

At the inception of projects, extensionists articulated project objectives to farmers, and the expected benefits and responsibilities of farmers, as has been reported elsewhere (Friederichsen et al., 2013; Parkinson, 2009). Likewise, extensionists trained farmers, monitored, and reported farmers' activities, carried out technology demonstrations and field days to achieve expected project outputs similarly reported in other studies (Brown, Nuberg, et al., 2018a; Friederichsen et al., 2013; Gido, Sibiko, Ayuya, & Mwangi, 2015). Extensionists preferred farmers and farmer groups they had worked with previously and with whom they could guarantee project activities would be implemented as reported by Glover et al. (2017). Extensionists matched farmers and farmer groups with project activities to optimize benefits to farmers and also to ensure project outputs and presumed outcomes were achieved in line with the accountabilities associated with the project. There was a sense from the research that both the extensionists and many farmers 'understood the rules of the game' with projects due to the extensive history of this type of extension and development activity in the area and they worked together to gain benefits from the project and ensure the extensionists' accountabilities were met. Extensionists worked to maintain their already established relationships with farmers by ensuring they had sufficient information to make informed decisions about projects. In addition, extensionists also worked with existing farmer groups, or farmer contacts, to change or expand their group activities to fit project demands and, therefore, gain access to project benefits.

In this research, extensionists creatively worked around (circumvented) and within project directives to achieve outcomes for farmers formally included in and beyond projects. Extensionists collaborated with colleagues in neighbouring wards to circumvent a farm machinery booking system that was restricting access for some farmers to machinery. Past studies also identified that extensionists circumvent project directives to achieve project outputs through avenues best suited to farmers' circumstances and processes of change (Friederichsen et al., 2013). In this research, extensionists worked through projects to include and provide access to project benefits

for farmers beyond those formally signed up or included in the project. Further, they also used opportunities presented by project activities to extend other information and extension messages to farmers, for example, information on climate change. Servicing farmer needs through technology transfer is discussed in the next section.

6.9 Servicing farmers' needs through technology transfer

Extensionists acted as conduits transferring technologies to farmers, a finding consistent with that of other research in rural Africa (Brown, Llewellyn, et al., 2018; Chimoita et al., 2017; Lambrecht et al., 2014; Makate & Makate, 2018; Wanvoeke et al., 2016). In this study, some of the activities extensionists undertook with farmers around technology are similar to what other literature has identified, that is, farmer mobilisation, creating awareness, on-farm demonstrations and field trials (Lambrecht et al., 2014; Makate & Makate, 2018). Extensionists' efforts were geared towards persuading farmers to voluntarily change and to convince them to try out new technology as reported by Lambrecht et al. (2014) in DRC-Congo, and Vrain and Lovett (2016) in England, as well as returning to technologies rejected in the past. In this study, extensionists persuaded reluctant farmers to adopt an improved variety of sorghum, despite farmers having had previously poor experiences with sorghum. Extensionists used cooking demonstrations to prepare products for farmers to appreciate the taste of the improved varieties of sorghum and change their existing mindset on sorghum as a food for the poor and birds. In this case, extensionists acted as change agents (Ingram, 2008; Rogers, 1995) using their expertise to convince and persuade farmers to change their attitudes, food preferences and habits to adopt desirable technologies such as sorghum.

This study found that the extensionists' role in technology transfer varied depending on what was needed to support and facilitate farmers' acceptance and ultimate use of the technology. In some instances, they worked to reconfigure technologies to the local context. For instance, extensionists deconstructed CA into component practices and facilitated a gradual transition by farmers which allowed smallholder farmers to implement the practices in a way suited to their contextual situations as recommended by Brown, Nuberg, et al. (2018a). This was to enable farmers to transition from their existing practices (use of oxen plough) to new practices (use of soil rippers) and to enable households to organise resources such as labour and finance required to implement the technology.

Extensionists translated physical and technical specifications of technologies to better reflect farmers' specific circumstances. Extensionists worked with farmers through an iterative process to translate the original design of farm ponds as shared by the initiator to fit the local soil and ecological conditions. For instance, extensionists recommended and supported farmers to access dam liners to improve the water-holding capacities of the farm pond, thus differing with the original design. Furthermore, extensionists collaborated with local farmers and the initiators of technologies to adapt and fit CA implements to local conditions. Extensionists tapped farmers' (and local artisans') experience with farm implements and their understanding of the context to re-configure and improve the utility of the CA technology and farm implements. This study aligns with scholars such as Glover et al. (2017) and Brown, Nuberg, et al. (2018a) who acknowledge the interactional practices between extensionists, farmers and other actors to reconfigure and adapt technologies to meet contextual realities of smallholder farmers.

A contribution of this study is in the findings of how extensionists dealt with existing social and cultural challenges that impeded the ability of women farmers to implement learned farm technologies such as the CA. In the past, extension actors have been blamed for not addressing this challenge (Mudege, Chevo, Nyekanyeka, Kapalasa, & Demo, 2016; Po & Hickey, 2018; Ragasa, Aberman, & Alvarez Mingote, 2019; Ragasa et al., 2016; Williams & Taron, 2020). Extensionists coached women farmers on how to negotiate and convince their husbands to allow them to implement the Zai pit and the CA technology which they had gained knowledge from the extensionist. An extensionist reported how he advised his women farmers to ask their husbands to allow them to practice the technology at the edge of their farm and then use the performance of the area with the technology to negotiate for more land to extend the use of the technology.

6.9.1 **Farmer to farmer technology transfer extensions**

Extensionists mobilised farmers through other farmers and through local leaders to attend trainings to learn about new technologies. Extensionists tapped into the community's cultural capital and the value farmers attach to learning from each other and from sharing technologies along kinship ties to boost technology adoption. Drawing on kinship ties in extension practice has been highlighted in other developing country contexts (Kiptot, Franzel, Hebinck, & Richards, 2006). The extensionists were implicitly aware of the value of the social capital embedded in the local communities in which they lived and worked. For instance, an extensionist reported that farmers took pride in being taught by their "own daughters and sons," (*mwiitu uu witu, mwana uu witu)*.

Existing studies predominantly highlight that social capital embedded in farmers' groups enhances the uptake and ongoing use of technologies through farmer to farmer extension (Brown, Nuberg, & Llewellyn, 2018b; Dube, 2017; Kiptot & Franzel, 2015; Kiptot et al., 2006; Lambrecht et al., 2014). This research highlights the social capital within existing social and cultural groupings within rural communities in Kenya and how they are used by extensionists. Extensionists utilized their knowledge of the community and social and cultural groupings, to extend the reach of their extension efforts.

Aligning with this way of working, farmer-to-farmer extension is a model of extension that was embedded in the development projects and utilized by NGOs who refer to key farmers as model, super or lead farmers. In these projects, the criteria for selecting these farmers tended to be a certain level of education, those who have shown a willingness to be involved in projects and have had previous experience in projects. These farmers, reflecting the previous T&V approach, accepted and received training and were supervised by extensionists to deliver training and oversight to other farmers. Extensionists tended to nominate farmers they had worked with for a long time and who understood the expectations of the projects, in other words, who knew the rules of the game in terms of working in and with projects with the extensionist. As was the case in this research, farmer-to-farmer extension was accepted as a viable way to disseminate technologies due to the existing relations and trust between farmers (Brown, Llewellyn, et al., 2018; Dube, 2017; Kiptot & Franzel, 2015). However, other scholars criticize this as a strategy of government and development organisations to push technologies that align with their goals, reaching most farmers for the least cost (Turner et al., 2021) rather than seeking to match farmers' perceived needs.

In this research, extensionists worked with lead farmers to expand the number of farmers trained in technology, (e.g., CA) offered within projects. However, they also worked with lead farmers to convey extension messages to farmers beyond those associated with projects. Extensionists in this study incentivized and rewarded lead farmers' work to boost their morale and maintain their ongoing support. For instance, extensionists recommended lead farmers for recognition and awards from collaborators such as the FAO and nominated them for trips to reward their efforts.

Other studies in Kenya highlight the positive outcomes in development work from farmer-to-farmer extension (Kiptot & Franzel, 2015; Kiptot et al., 2006). This type of approach to extension work was not a choice extensionists had in their project work. It was often embedded in the project design and in the project outputs which extensionists were required to meet. The number of farmers, and or the extent of

technology adoption within an area required by projects, could not be achieved by the efforts of only the extensionists, but assumed farmer-to-farmer extension would also be used. It is a strategy that reflects the limited number of extensionists working with large numbers of farmers and the level of resource challenges facing extensionists. However, the extent to which it is now locked into project design suggests changes in the funding of extension and how extension can and will be delivered in the future in these areas are unlikely. Parkinson (2009) and Brown, Llewellyn, et al. (2018) also note that the push to deliver on projects and to legitimise their role, pressured extensionists to persuade farmers using incentives to adopt technologies. This illustrates the fine-line extensionists are navigating to achieve outcomes for farmers which align with their needs and also satisfy the requirements of projects that fund extensionists' activities and prescribe and provide the technologies assumed to match farmer's needs.

6.10 **Extensionists as Resource Brokers**

The need for extensionists to resource and the drive to source and optimise the use of available financial and physical resources was dominant in this research. A contribution this research makes is to introduce the role of resource broker into the extension lexicon to recognise this work. Resource-brokering emerged as an activity that extensionists spent a lot of time doing and it was interwoven through most aspects of both front-office and back-office activities across most elements of their work. The extent of the work of extensionists in developing countries spent on resourcing has not, to date, been acknowledged or understood. Past scholarly literature identifies the challenges facing extensionists because of limited resources and the strategies used to cover the deficit. In sub-Saharan Africa, public extensionists listed the lack of financial resources as a factor affecting their performance and ability to deliver extension services to smallholder farmers (Ragasa et al., 2016). As already alluded to, extensionists were found to build and maintain personal and professional networks over the course of their work which became their primary means of accessing financial and physical resources needed to carry out their work and support farmers.

In this study, it was established that extensionists have strong networks among actors at the local and national extension systems, and they work hard in maintaining and retaining those networks. Extensionists networks comprised contacts they have gained from many years of experience. Extensionists in this study valued, invested, and maintained their strong and broad networks to secure reliable and up-to-date knowledge, as also reported by Labarthe and Laurent (2013) from a context of

privatised extension services. Extensionists were found to have maintained contacts with actors who no longer worked in the area, but still worked in agriculture. Extensionists facilitated the initial relationships with new extension actors to expand their networks and tap into their expertise, and physical and financial resource opportunities for farmers and themselves. Similar findings were noted by Klerkx and Proctor (2013) and Eastwood et al. (2017) in studies conducted in Europe and Australia where extensionists tapped into the knowledge of other actors in their networks: work referred to as constituting knowledge brokering. However, unique to this study is how these networks are used by extensionists operating with limited financial and physical resources to access resources within and beyond projects to enable their work with farmers in what is defined in this research as resource-brokering.

As has already been discussed, extensionists worked to optimise the reach of their extension efforts and funding through projects to include, not only farmers involved in projects, but those beyond the project who could also gain benefit from project activities and technologies. They sought efficiencies in all their activities and worked to optimise benefits to farmers from all opportunities.

Extensionists working in areas with NGOs and projects, gleaned physical and financial resources to do extension work. What the study established is that extensionists' established long-term reciprocal relationships which they took advantage of to access resources. For instance, an extensionist recounted walking into the offices of a local NGO and requested fuel to enable them to travel to farmers to do their extension work. Argentinian public extensionists were similarly reported to 'knock on any door' in an effort to secure limited financial resources to facilitate their work (Landini, 2016, p. 197).

Extensionists traded on their bonding and bridging social capital in, and knowledge of, the area to work with, and access resources from, actors working for short periods in the area. For example, extensionists reported that staff from research and or private organisations occasionally walked into their office looking for assistance to meet and train certain farmers (e.g., sorghum growers) or to collect data from the ward. Extensionists piggybacked on these actors' activities and travelled with them around the area meeting farmers and delivering services they wanted to deliver. In return, extensionists introduced actors to farmers who aligned with their interests and helped to ensure the actors accomplished their plans.

Extensionists in those areas where projects were limited, exhibited creativity in how they organised their work and how they utilised the limited resources at hand. They shared transport resources, utilised forums organised by local authorities to meet farmers and optimised on such forums to deliver as much service as possible. In both areas, extensionists were found to complement each other's expertise, a strategy they used to maximise resource opportunities from a development organisation.

6.10.1 Extensionists resourcing themselves from the Government

Extensionists understood strongly the politics associated with resourcing extension and the agriculture sector in Kenya, as noted by Eidt et al. (2020) and strategically navigated this space by maintaining good working relationships with key political actors. As mentioned, over 80% of the extensionists are locals who understood the local political power dynamics. Extensionists reported how they worked to forge good social relations with local politicians and leveraged on the politicians' position to influence county government funding for extension services. For example, extensionists sought politicians' support by attending local political forums organised by the County Assembly Ward Representatives and supporting their projects and initiatives. The importance of social relations at the local level for securing resources for government employees in Kenya, has previously been recognized (Funder & Marani, 2015). The study showed that frontline Environment Officers (EOs) negotiated their way through local actors who actively shaped the governing of state resources (Funder & Marani, 2015).

Extensionists also worked through farmers and their power in the process and their proximity to the county leadership to push for financial and physical resources such as farm machinery and motorbikes from the county government. The changes in the county fiscal planning bestowed powers on farmers, not extensionists, for demanding/ requesting what they needed from local government. Unfamiliar with this process, farmers tended, in the view of extensionists, to limit their demands or did not attend meetings to put forward their demands. Extensionists played a role in facilitating/ encouraging farmers' participation in this budgeting process and coached farmers and lobbied through them in a way that ensured great benefits for farmers and resourcing for extension work. For instance, extensionists encouraged and pushed farmers to ask for a backhoe excavator to support farm pond excavation and soil rippers from the county government because extensionists were aware farmers struggled with manually excavating the ponds.

What emerged from the study is that the extensionists' back-office activities with local NGOs contributed to how they engaged with farmers in front-office resourcing activities. Extensionists resourced farmers to support their effort to implement technologies, for instance, extensionists sought and gained direct financial support from NGOs for poor farmers who had manually excavated farm ponds yet lacked the financial resources to purchase dam liners. To support the NGOs, extensionists reciprocated and monitored their projects in the wards and reported their findings to the NGOs. Aware of resource opportunities for farmers (e.g., dam liners) from NGOs, extensionists utilised their inside knowledge to encourage and coach farmers on what to do to access support from the NGOs. Behind the scenes, extensionists advocated for the same farmers to enhance their chances of receiving support. These findings expound and enrich the existing scholarly work on the extent of back-office activities undertaken by extensionists (Petit, Compagnone, Lémery, Kockmann, & Moretty, 2011). These findings show the differing nature of activities extensionists do "behind the scenes" in a developing country working in a context dominated by development projects and non-research entities.

6.11 Climate change and extensionists' work

An initial interest for this research was in exploring how extensionists work to help smallholder farmers overcome climate change challenges. As was outlined in chapter one, it emerged early in the data collection that to explore this there was a need to understand, in depth, how extensionists do what they do in the entirety of their work, and this then became the focus of the research. It is timely, however, to return to climate change and reflect on what can now be said about how extensionists engage in work related to climate change.

Extensionists work with smallholder poor farmers in Kenya to reduce the impact of, and build resilience to, climate change. This is principally done through the transferring of climate change linked technologies to farmers. There was no evidence that in seeking to respond to the challenges of climate change, extensionists had changed the way they work with farmers or the broader extension system. The needs of farmers did reflect issues related to climate change, (e.g., changes in pests and diseases and rainfall and weather patterns) but the mechanisms through which extensionists sought to respond to these were similar to how they responded to other issues, including those relating to crop establishment and production.

6.12 **Summary**

How extensionists do their work is made visible in this research as being context specific. It is a dominant decentralized public extension system primarily directed at serving resource-poor subsidence smallholder farmers. Extension services are free and mainly supply-driven through development projects. There is a dominance of development culture which is reflected through government and donor projects in the county. It is also reflected in the mix and type of extension actors within which extensionists operate. How extensionists are positioned within the systems and with other actors is a reflection of the contextual characteristics in Kenya and the area of research. In this study, farmers are reflected as beneficiaries rather than clients of extension services. This is also a reflection of the long history of public extension services where farmers receive free and subsidized inputs and services from Government (situations on the ground are different).

This research demonstrates that extensionists work in what can be interpreted as a hybrid demand-supply driven extension system where they respond to direct farmer inquiries as well as supply services to farmers in accordance with projects and government accountabilities and goals. Regarding key elements of extensionists' work, it has emerged that it includes servicing farmers' needs, technology transfer, project delivery that conforms to the traditional work of extensionists in developing countries. and optimising the benefits of resource-brokering. A significant contribution of this study is the finding that extensionists are resource brokers and the illustration of the diverse skills and the amount of effort they put into resources, financially and physically, their work, and for farmers. A further contribution this research makes is to highlight that Kenyan extensionists work to maintain and build legitimacy in their role with Government, local political leaders, and the wider community. This research also shows the huge extent of work undertaken by extensionists behind the scenes (referred to as back-office work) and the interconnectedness between activities extensionists do with farmers and what they do with other extension actors.

In developing countries such as Kenya where resources are limited for extension work, and farmers are poor and unable to pay to access services, extensionists are illustrated in this study as resource brokers and this role constitutes a significant part of their work. This is critical since it enables them to deliver on their role especially when forced to operate in an environment of limited physical and financial resources. A significant factor that shapes this role is extensionist-farmer relationship and their relationships with other extension actors and the knowledge of the local political, social and economic contexts that help them achieve their goals. This study shows extensionists

have a strong bond, and bridging networks established over their course of their work, which they work to build and maintain. Extensionists glean, leverage, barter, haggle and piggyback to access resources from actors in these networks to support the extension work and support their farmers. However, the study illustrates that due to the institutional and structural change extensionists feel neglected and unsupported in their work.

The research illustrates a mix of factors that shape the extensionists' role as resource brokers. These factors include their good understanding of the local political dynamics, their long-term established relationships with farmers and their established social relations with political leaders. Furthermore, this study has shown that extensionists understand the institutional and structural change associated with public resource planning and budgeting and the power dynamics associated with it. In this study, extensionists utilise their established relationship with farmers to coach and lobby through them access resources from the Government. From this study, there was a sense that both the extensionists and many farmers 'understood the rules of the game' with projects and NGOs due to the extensive history of this type of extension and development activity in the area. Both works together to gain resource benefits from projects and NGOs and ensure extensionists' accountabilities and farmers' needs are met. Extensionists mould and match-make farmers and farmer groups to align to project specifications to access benefits.

Framing extension work as a situated practice enabled me to draw attention to the relationship between extensionists and the context of their work. The context emerged as powerfully mediating and shaping how extensionists navigate their multiple roles. This is depicted through how extensionists enact different strategies as they encounter different technical, institutional, and structural challenges in their day-to-day work. The research illustrates the agency of extensionists as expressed in their capacity to broker resources, negotiate access to technologies, circumvent institutional processes such as public participation, and work with farmers to optimise project benefits.

In conclusion, this chapter illustrates the extent of resourcefulness and creativity of extensionists and their ability to develop strategies to navigate the multiple demands and the accountabilities placed by farmers, the employer, projects, funding entities and other actors in the extension system. In the next chapter, conclusions and implications of the findings of these case studies are provided, and methodological reflection and the key areas for future research are outlined.

CHAPTER 7 RESEARCH CONCLUSIONS

The aim of this research is to inform extension practice in developing countries like Kenya to more effectively address the complex needs of smallholder subsistence farmers which include poverty, food security and climate change. The specific question that this research sought to answer was what do extensionists do, how do they do what they do and what shapes how they do what they do? To answer the research question, the researcher selected a case study of public extensionists working at the ward level to service the needs of smallholder subsistence farmers practicing mixed farming systems in Makueni County in Kenya. All extensionists who participated in this study had worked for over ten years, and over 80% of them were locals, hence knowledgeable of and known by the community and familiar with the local social, economic and political dynamics. Over a period of four months, the researcher collected data through in-depth interviews with ward extension officers, and also drew on documents and unstructured participant observations. This data was supplemented with interviews of representatives of NGOs, research organisations and other organisations mentioned by extensionists as collaborators in the delivery of extension services and supporting farmers in the County. Significant to the study is that it was set during a period after major institutional and structural changes in public extension in Kenya. These changes included efforts to shift away from supply-driven to demand-driven extension and the transition of public extension services from the central Government to the devolved county governments.

The purpose of this chapter is to present the conclusions that can be drawn from this research. The policy implication of the research is explored and consideration is given to future research that will advance and inform extension policy and practice in Kenya and other countries. Finally, reflections on the research design are made and some final thoughts on the research offered.

7.1 Conclusions

Extensionists' work is context-specific, and place-based, but it is fundamentally focused on servicing farmers' needs through extension work and activities that, to a large extent, have not changed for many years. Extensionists seek to service farmers' needs through the transfer of technologies, the provision of advice and training and the facilitation of practice change among farmers often framed by projects. Extensionists work with farmers through both one-on-one and farmer group activities which include on-farm demonstrations, field days and training events, as well as working directly with

farmers to assist them implement technologies in their farms. In a supply-driven model of extension in which extensionists accountabilities are tied to the design and funding of extension projects, the practices of extensionists will reflect the extension approaches and accountabilities embedded in the design of the projects. The metrics employed to monitor extensionists' work shape the work they do with farmers and behind the scenes to support their work with farmers. The metrics also tend to lock in extension practices that fulfill measures that include the number of farmers who participated in projects and events, and the number of farmers who use a technology rather than outcomes linked to reducing poverty, food insecurity or resilience to climate change.

Context characteristics that are suggested as shaping how extensionists work include the relative mix of public and private extension and/or demand and supply-driven extension and the level of resourcing available. The wealth and extent of commercialization among farmers, as well as the extent to which rural development is associated with extension, also shapes the work of extensionists.

Extensionists' work with smallholder poor farmers in Kenya to reduce the impact of, and build resilience to, climate change. There was no evidence that in seeking to respond to the challenges of climate change extensionists had changed the way they work with farmers or the broader extension system. The needs of farmers did reflect issues related to climate change, (e.g. changes in pests and diseases, and rainfall and weather patterns). However, the mechanisms through which extensionists sought to respond were similar to how they responded to other issues including those relating to crop establishment and production.

Extensionists are hugely creative and resourceful. The creativity and resourcefulness of extensionists lies in the way they draw on their networks with farmers and other actors in the extension system. They develop strategies to service farmers' needs by working within and circumventing the scope, funding and requirements of projects and initiatives. In a context of resource scarcity for extension and farming, extensionists fulfil the role of resource broker as a strategy to resource extension work and support poor farmers. This role will likely be interwoven across most aspects of their work and will be evident in how they glean and haggle for, lobby directly and through farmers for physical and financial resources; leverage off, trade and piggyback on the resources of other actors; and seek through cooperation with colleagues to optimise the access to and use of available resources.

In addition to working directly with farmers, the work of extensionists in a public-funded extension system contains a significant amount of behind-the-scenes work (back-office work (Labarthe & Laurent, 2013) which, to date, has not been explicitly recognised in extension literature. The back-office aspect of an extensionist's work is incorporated in roles including those identified as knowledge brokers (Klerkx & Peter, 2012) innovation and technology intermediaries (Howells, 2006; Kilelu et al., 2011; Makate & Makate, 2018) but the extent to which it comprises what extensionists do and the skills and capability required to fulfil these aspects of their work, have received little attention. This study argues for greater recognition in research and in extension education on back-office aspects of extensionists' work, including the importance of building and maintaining bonding and bridging social capital to enable and support extension activities and roles.

The structural and institutional change implemented in the Kenyan Government's extension system seeks to move from a supply-driven to a demand-driven model for extension where farmers have more direct influence over the focus, funding, and content of extension with a consequent reduction in the role of government and extensionists in this space. The extent of change this requires is shown in this research to include not only major structural and institutional changes at the national, and county levels, but also at the ward and extensionist-farmer and extensionist-local government local extension system level. The change will not be achieved quickly. For extensionists, the shift is personal, because it demands a change in their involvement with and for farmers in setting extension priorities. It also changes the basis of their legitimacy as extensionists and, hence, their status within the community and positioning in relation to farmers. Likewise, for farmers, it requires the gaining of new skills, competency, and confidence to participate in processes to demand extension in line with their needs and it also requires farmers to change dramatically the expectations they have from development projects and extension and, hence, extensionists.

Technology transfer is at the core of extensionists' work where extension is dominated by projects funded and designed by Government and other local and international NGOs. Extensionists work involve technology transfer, assessing, deconstructing, adapting and reconfiguring technology to match the specific requirements and situations of farmers. It also involves mobilising farmers to adopt the technology directly and through influential actors in the community. As highlighted elsewhere, the specific activities through which technology is transferred and diffused by extensionists will

reflect, but not be limited to, the requirements of the projects promoting the technology and funding of the extensionists' work.

7.2 Practical Implications and recommendations

This study notes the existence of an aging extensionist human resource in Kenya and a lack of young professionals to inherit the wealth of knowledge, experience and networks extensionists have accumulated over many years of service. That gap implies a potential change in addressing existing and emerging farmers' needs such as the climate change. Climate change is one of the challenges that contributes to some of the immediate problems farmers have and that extensionists respond to, and it is also deeply embedded in many of the technologies in the projects within which they work. This thesis establishes that, to a large extent, climate change has not influenced how extensionists work because they continue to work primarily within the framework of the structures of the projects. The climate change component is expressed in the nature of the technologies that extensionists are working with farmers to implement and adapt. A level of change is required if extensionists are going to engage differently with climate change with farmers; this research suggests that a similar level of change to that of institutional and structural change is required to shift extensionists. This study shows extensionists have significantly shifted their way of working and adapted to the new institutional and structural changes. This includes leveraging on the networks to broker resources to facilitate themselves and farmers.

7.3 Reflections on Research Design

The choice of the researcher to focus on public extensionists working at the field-level as the key participants in this study, provided an opportunity to explore their lived experiences and make visible what they do and how they do what they do. The use of a single case study approach was appropriate because it enabled the researcher to interview ward extension staff from 26 out of the 30 wards representing 80%. This would not have been possible if the study was based on multiple case studies stretching across counties.

The use of in-depth interviews provided an excellent opportunity to draw all the nuances and complexities associated with being an extensionist. Upon reflection, the researcher's decision to interview at least one extension person from each of the 30 (that was the plan) administrative wards helped to unearth the existence of significant differences in extension activities in wards with projects and NGO presence and those without. The researcher had not conceptualized the existence of such a difference and

how it shaped how extensionists do their work prior to undertaking her fieldwork. A pre-study would have better informed the researcher.

The use of a tape recording was vital for this study. This was because of the length of interviews with participants and sometimes the environment in which the interviews took place. It would have been challenging to accurately capture these data through written field notes. The rapport created with the interviewees made it easy for them to share their experiences. The researcher worked previously as an extension officer and spoke the local community's language. This made it easy to understand the jargon and some local terms used by participants to describe the context, that is, vitu *kwa ground sio the same* (differentiate between the ideal and real).

Field data collection was a success but required grit. The Ward Agricultural Offices are far apart, and the researcher did not have a private means of transport. The participants were welcoming and friendly.

Manual transcribing of the data was challenging. The researcher took three months to transcribe the data individually and manually. This would have been possible with a software such as NVivo, however, there were English language diction challenges. Owing to the large volume of data, the data analysis process took a long time. The researcher used the NVivo a software at some point in data analysis process, that is, organisation of themes which later helped in the writing of results. In a nutshell, the research design, in terms of choice of data collection tools and the data analysis, worked satisfactorily. The researcher was able to answer the research question as set out for this study.

7.4 **Concluding thoughts /future research**

Resource brokering is identified in this research as a key role fulfilled by extensionists in countries where the funding of extension is limited and provided through projects funded and organized by multiple government and non-government entities. Further research is required to identify the strategies used by extensionists in different contexts to fulfill the role of resource broker, in particular, to compare the strategies of extensionists in countries that have made greater progress towards demand-driven extension than has Kenya. Likewise, there is a need to explore the extent to which this role is fulfilled by extensionists working in countries in which funding is provided through a mix of private and public extension. This will inform education and extension policy on the training of extensionists to include imparting capabilities and skills about resource brokering because it is a significant part of their job.

Research is required to explore the transition from supply-driven to demand-driven and the nature of the changes required amongst extensionists, as well as farmers, to transition in a way that does not disadvantage farmers. Further research is necessary to explore how extensionists can support the transition of farmers from being passive and beneficiaries of extension services to drivers of demand-driven extension and to partners in extension. Studies that challenge the deeply embedded traditional designs and ways of doing extension and explore new, positive and meaningful ways of engaging with farmers to assist them to learn and change is needed.

This research recommends further studies to understand the institutional and structural changes required within extension systems to best-fit climate change work within existing extensionists' roles and realities. This study suggests further research on alternative approaches to supporting smallholder farmers to adapt to climate change rather than using the traditional development project-driven approaches which have previously been termed as unsustainable beyond project funding (Christoplos, 2012). With the shift from the national to the county government, public extensionists need training on the new system of governance. There is a need to create platforms within the Ministry to enable extension staffs to dialogue with each other and the management on ways to improve extension service delivery. Owing to the multiple roles played by public extensionists, there is a need to equip extensionists with a wide range of capabilities, that is, resource brokering, networking, to complement their existing technical skills in order to keep the old extension truck on the road.

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APPENDICES

Appendix 1 Categories of farmers extensionists work with

Agricultural and policy documents categorize farmers in terms of resource endowment, farm size, production scale, farming activity and commercial and non-commercial. In this study extension agents identified farmers also in terms of age, gender, and resource endowment.

Type of farmers	**Characteristics as described by research participants**
Women	They stay in the rural home mostly The perform most farming activities such planting, weeding, They are the largest attendants of extension activities such as farmer trainings • They form the bulk of the members of farmer groups • Customary they do not own family land unless widowed • They have limited access, control and decision making about crops to grow, when and how much to sell, farm technologies and implement use • Women own small livestock such as poultry and sometimes goats • Are incharge of vegetable gardens and production of legumes
Men	• Culturally men own land and have control and decision making, they control the use of farm implements such as ploughs, tractors and make major decision making on what and how to plant. • They own livestock mostly cattle, donkey, goat production, pasture, large scale fruit production such as mangoes • Some attend farmer trainings but not as common as women do • A good percentage of men are absent from home as they work away in the cities and in towns
Youth	• They are the majority, • Majority are educated, • They are the mobile technology users, • Majority do not own no land until bequeathed by their parents, • They are said not to like agriculture and farming activities, • They want quick money from businesses such as motorbike riding, • They have special funding and opportunities by agencies such as world bank, county, WFP, part of the affirmative action
Old farmers	• old/older Men;

	• They own land thus have control and decision making, • They seldom attend farmers training, • They make major decision on land use • They are rigid to change hence impend use of technology they are not trained about. • they own livestock mostly cattle, donkey, goat production, pasture, large scale fruit production
Vulnerable persons in the community	• These are majorly widows, people living with HIV and any form of disability, the poor and landless members of community who cannot afford inputs and basic household effects • Women and youth are also categorized as vulnerable

Appendix 2 Information sheet for participants

MASSEY UNIVERSITY
COLLEGE OF SCIENCES
TE WĀHANGA PŪTAIAO

School of Agriculture and Environment

Research Topic: What shapes agricultural advisory agents' roles in supporting smallholder farmers' adaptation to climate change in rural Kenya?

INFORMATION SHEET

Dear Sir/Madam

My name is Romana Mbinya, and I work for Jaramogi Oginga Odinga University of Science and Technology in Bondo in Kenya. I am undertaking PhD in Agriculture Extension in the School of Agriculture and Environment at Massey University in Palmerston North, New Zealand. I am currently undertaking a research study of how agricultural advisory agents support smallholder farmers' adaptation to climate change in Kenya. As part of the research study, I am conducting fieldwork in Makueni County.

Description of the study and invitation to participate in this study

Agricultural extension services in Kenya have long supported farmers to improve agricultural production. Agricultural extension services is now tasked with implementing policies on climate change as well supporting farmer's adaptation activities. This research will explore how extension agents navigate through multiple roles and what shapes their role and practice. This research aims at enhancing the understanding of how agricultural extension agents' roles and practices towards supporting adaptation to climate change can be improved for the betterment of smallholder farmers in Makueni County and beyond.

In order to achieve the stated research aim, I would like to collect data from agricultural extension agents in Makueni County. Concerning this, I would like to invite you to participate in this research study. Once you have agreed to participate, I would like to ask you for your permission to audio record our interview session.

The following are your rights as participants in this study.

1. You are free to ask questions about the study during or after your participation.
2. You can withdraw from the study at any time during your participation
3. You can ask for the audial record to be turned off at any time during the interview.
4. That your personal details such as name, address, phone number will not be revealed to anyone outside the study without your permission.

Data Management

I will transcribe the information recorded for analysis with the help of a transcriber who will sign a confidentiality form. The data collected will be stored in a portable hard drive, backed up in my google drive for safety, and secured with a strong password. The confidentiality of all the participants will be maintained by keeping the identities of participants anonymous. Given the site, there are chances that some participants may be identified especially those occupying certain administrative positions. I will use the collected data to write and publish a PhD thesis in Agriculture Extension. My final published thesis will be accessible at the Massey University Library via the online catalogues.

This research project has been evaluated through peer review and judged to be of low risk. However, none of the members of the University's Human Ethics Committee has reviewed the project. The researcher named above is responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher, please contact Professor Craig Johnson, Director Research Ethics, email humanethics@massey.ac.nz.

Project contact

In case, you want more information about my research, feel free to contact my supervisors or me through the address listed below.

Researcher

Romana Mbinya,

School of Agriculture & Environment

Phone: +254 714095632

Email: r.mbinya@massey.ac.nz

Main supervisor

Dr. Janet Reid

School of Agriculture & Environment

Tel: +64(06) 3569099 ext. 84818

Email: J.I.Reid@massey.ac.nz

Co-supervisor

Dr. Carolyn Morris

School of People, Environment & Planning

Tel: +64(06) 3569099 ext. 84632

Email: C.M.Morris@massey.ac.nz

Appendix 3 Participants consent form

MASSEY UNIVERSITY
COLLEGE OF SCIENCES
TE WĀHANGA PŪTAIAO

Research Topic: What shapes agricultural advisory agents' roles in supporting smallholder farmers' adaptation to climate change in rural Kenya?

PARTICIPANT CONSENT FORM - INDIVIDUAL

I have read and I have had the details of the study explained to me as stated in the Information Sheet attached. Any questions I had have been answered to my satisfaction, and I understand that I may ask further questions at any time. I have been given sufficient time to consider whether to participate in this study and I understand, participation is voluntary and that I may withdraw from the study at any time.

1. I agree/do not agree to the interview being audio recorded.
2. I agree to participate in this study under the conditions set out in the Information Sheet.

Declaration by Participant:

I _____hereby consent to take part in this study.

Signature: _____ Date: _____

Te Kunenga ki Pūrehuroa

School of Agriculture and Environment (PN 433)

Private Bag 11222, Palmerston North 4442, New Zealand **T** +64 6 356 9099 F +64 6 350 5680;

Appendix 4 Department of Agriculture, Irrigation, Livestock and Fisheries Development Performance Contract for the 2019/2020 (Government of Makueni County, 2019)

REPUBLIC OF KENYA

GOVERNMENT OF MAKUENI COUNTY

DEPARTMENT OF AGRICULTURE, IRRIGATION, LIVESTOCK AND FISHERIES DEVELOPMENT

PERFORMANCE CONTRACT BETWEEN

THE GOVERNOR, MAKUENI COUNTY

AND

COUNTY EXECUTIVE COMMITTEE MEMBER

DEPARTMENT OF AGRICULTURE, IRRIGATION, LIVESTOCK AND FISHERIES DEVELOPMENT

FOR THE PERIOD 1ST JULY 2019 TO 30TH JUNE 2020

Performance Contract Agreement

This Performance Contract (hereinafter referred to as "Contract") is entered into between the County Government of Makueni (hereinafter referred to as ("CG") represented by H.E. the Governor of P.O. Box 78-90300 M a k u e n i , (together with its assignees and successors) of the one part, and the County Department of Agriculture, Irrigation, Livestock and Fisheries Development represented by County Executive Committee Member (hereinafter referred to as the "the CECM), (together with its assignees and successors) of P.O. Box 78-90300, Makueni.

WHEREAS:
The County Government is committed to ensuring that public offices are well managed and they are cost effective in delivering quality service to the public in line with provisions of the Constitution of Kenya;
The County Government recognizes that Departments/Boards hold a vital key in the implementation of County priority programmes and projects, other national priorities including the "Big Four" Initiatives in order to improve the quality of lives of the people of Makueni County and make the County competitive;
The purpose of this performance contract is to establish the basis for ensuring that efficient and effective services are delivered to the people of Makueni County in line with the provisions of the Constitution and by requiring Departments to adapt systems that enable innovativeness and adaptability of public services to the needs of users.
This Performance Contract therefore represents a basis for continuous performance improvement that meets the needs and expectations of the county residents.

NOW THEREFORE, the parties hereto agree as follows:

PART I: Statement of responsibility of the ECM

The mandate of the Department is to promote and facilitate production of food and agricultural raw materials for food security and incomes; advance agro-based industries and agricultural exports and enhance sustainable use of land resources as a basis for agricultural enterprises.
It is my responsibility to provide the required leadership in designing suitable plans and strategies that will contribute to high and sustainable socio- economic development. It is my undertaking to ensure that the Department has a credible strategic plan and performance contract that will deliver the desired goals.
I undertake to perform my responsibilities diligently and to the best of my abilities to support the achievement of the agreed performance targets.

Part II: Vision, Mission & Strategic Objectives

a) **Vision:**
A food secure county
b) **Mission:**
To develop and implement structures for food production, processing and marketing on a sustainable basis.

c) **Strategic Objectives**

Pursuit to increasing crop and livestock production and productivity, the following are the strategic objectives: -

1) To promote zoning and value chain development
2) To intensify extension services for increased technology uptake
3) To promote irrigated agriculture
4) To promote post-harvest management, value addition and marketing
5) To improve access to inputs and services including farm mechanization services
6) To promote soil and water conservation, range rehabilitation and pasture development
7) To strengthen crop and livestock pests and disease control
8) To develop policies, legal frameworks and institutions for agricultural development

Part III: Statement of Strategic Intent by the County Executive Committee Member:

In carrying out my duties, I intend to put all my efforts towards contributing effectively and efficiently to the achievement of the county development agenda as espoused in the Kenya Vision 2030 and Makueni County Vision 2025 and the Makueni County CIDP 2018-2022, keeping in mind the specific priorities of my Department.

Bearing in mind the imperative of inclusivity, I will implement the following Strategic Intentions during the Financial Year 2019/20

1. Develop Departmental Strategic Plan and annual work plans anchored in the County Integrated Development Plan and Makueni County Vision 2025
2. Establish and operationalize service delivery, financial and related management systems for the department;
3. Establish a culture of service and accountability in the department, including working styles, attitudes and work ethics
4. Ensure that appropriate measures are instituted to mitigate against corrupt practices in the department.
5. Ensure timely approval of all requests for facilitation.
6. Ensure the necessary policies and legislation is in place to support departmental implementation.
7. Ensure adequate representation of the department

Part IV: Commitments and Obligations of the County Government

1. Develop County Integrated Development Plan, which should be anchored on National and County policies, SPS and national plans such as Vision 2030 Medium Term Plan III.
2. Establish and operationalize service delivery, financial and related management systems for the county.
3. Establish a culture of service and accountability in the county public service, including working styles, attitudes and work ethics.
4. Ensure that appropriate measures are instituted to mitigate against corrupt practices in the county public service.
5. Ensure timely approval of departmental requests.
6. Ensure timely availability/provision of necessary resources based on approved budget.

Part VII: Signatories to the Performance Contract

For County Department of Agriculture, Irrigation, Livestock and Fisheries Development:

Signature: ..... Date: 12/07/2019
Lawrence Nzunga
County Executive Committee Member
Department of Agriculture, Irrigation, Livestock & Fisheries Development

Witnessed by

Signature: ..... Date: 12th July 2019
Mary M. Muteti
Chief Officer
Agriculture and Irrigation

Signature: ..... Date: 12th July 2019
Martin Mboloi
Chief Officer
Livestock and Fisheries Development

For and on behalf of the Government of Makueni County;

Signature..... Date 12/7/2019

H.E. Kivutha Kibwana,
Governor
Government of Makueni County

Witnessed by:

Signature..... Date 12-7-2019
H.E. Adelina Mwau,
Deputy Governor
Government of Makueni County

ANNEX 1: PERFORMANCE CONTRACT MATRICES

	CRITERIA CATEGORY	Unit Of Measure	Weight	Current Status FY 2018/19	Target FY 2019/20
A	**FINANCIAL STEWARDSHIP AND DISCIPLINE**				
	a) Absorption of Allocated Funds	%	4	70	100
	b) Development Index	%	3	66.3	68.6
	c) A-in-A	Kes	1	41,892,960	8,300,000
	d) Asset Management	%	1	100	100
	e) Pending bills	%	1	≤1	≤ 1
	Weight Sub Total		**10**		
B	**SERVICE DELIVERY**				
	a) Implementation of Citizens' Service Delivery Charter	%	2	80	100
	b) Customer Satisfaction	Report	2	1	1
	c) Application of service delivery Innovations	%	2	80	100
	d) Resolution of Public Complaints	%	2	100	100
	e) Automation	Report	2	1	1
	Weight Sub Total		**10**		
C	**INSTITUTIONAL TRANSFORMATION**				
	a) Development of County Planning Framework	%	3	80	100
	b) Youth Internships/ Industrial Attachments/Apprenticeships	No	1	56	60
	c) Access to Government Procurement Opportunities (AGPO)	Kes	2	36,333697	13,200,000
	d) Promotion of Local Content in Procurement	Kes	1.5	132,697,608	17,600,000
	e) Competence Development	%	2	90	100
	f) Knowledge Management	%	2	90	100
	g) Work Environment	%	1	100	100
	h) Safety and Security Measures	%	1	80	100
	i) Cascading of Performance Contracts	%	1.5	100	100
	Weight Sub Total		**15**		
D	**CORE MANDATE**				
	FLAGSHIP PROJECTS :				
	1) Dairy development	%	10	95	100

	2) Integrated Grain value addition development	%	10	50	100
	Weight Sub Total		**20**		
E	**OTHER LIVESTOCK PROJECTS**				
	a) Feasibility study	%	3	90	100
	b) Construction of Abattoir	%	1	0	100
	c) Livestock Disease Control Programme	%	3	95	100
	d) Poultry development	%	4	90	100
	e) Fisheries development:	%	3	70	100
	f) Organize Makueni ASK Satellite Show	%	1	100	100
	Weight Sub Total		**15**		
F	**OTHER AGRICULTURE PROJECTS**				
	a) Horticulture – Fruit and vegetable crops value chain development	%	6	100	100
	b) Industrial crops development : (Promotion of Macadamia)	%	4	95	100
	c) Agricultural mechanization	%	1	100	100
	Weight Sub Total		**11**		
G	**DONOR PROJECTS**				
	a) ASDSP 11	%	1	60	100
	b) NARIGP	%	1	75	100
	c) KCEP CRAL	%	2	100	100
	d) SIVAP	%	1	30	100
	e) SHEP PLUS	%	2	100	100
	f) MYAEP	%	2	50	100
	Weight Sub Total		**9**		
H	**OTHER OPERATIONS**				
	a) Revenue Collection	Kes.	1	41,892,960	8,300,000
	b) Ease of Doing Business	%	1	100	100
	c) Compliance With Statutory Obligations	%	1	100	100
	d) Project Completion Rate	%	1	85	100
	e) Maintenance schedule	%	0.25	100	100
	f) Maintenance of buildings and stations	%	0.5	100	100
	g) Maintenance of vehicles, plant and equipment	%	0.25	100	100
	Weight Sub Total		**5**		
I	**CROSS-CUTTING ISSUES**				

	a) Prevention of Alcohol and Substance Abuse	%	0.5	90	100
	b) Prevention of HIV Infections	%	0.5	90	100
	c) Disability Mainstreaming	%	1	100	100
	d) Gender Mainstreaming	%	1	100	100
	e) Environmental Sustainability	%	1	100	100
	f) Corruption Prevention	%	0.5	100	100
	g) National Cohesion and Values	%	0.5	100	100
	Weight Sub Total		**5**		
	OVERALL TOTAL WEIGHT		**100**		

EXPLANATORY NOTES

A. FINANCE AND STEWARDSHIP:	
Absorption of Allocated Funds	The department commits to absorb 100% of all allocated funds for recurrent(Ksh.239,505,994.79) and development expenditure (Kes 523,822,882.45) by 30th June, 2020
Development Index	The department commits to achieve 68.6% development index for the financial year 2019/20. (Kes 523,822,882.45/ Kes 763,328,877.24*100 =68.6%)
Appropriation-in-Aid (A-in-A)	The department will benefit from A-in-A totaling to Ksh.8,300,000 from revenue collection
Asset Management	The department commits to achieve 100% in asset management through: - i) Preparing an asset maintenance schedule (40 %) ii) Implementing the maintenance schedule (20%) iii) Service, repair and maintain all vehicles and machinery (40%)
Pending bills	The department commits to ensure that the pending bills do not exceed 1% of actual budgetary allocation for the financial year ending 30th June 2020.
B: SERVICE DELIVERY:	
Implementation of Citizens' Service Delivery Charter	The department commits to: i) Audit compliance of the service charter (70%) ii) Implement findings of the audit (30%)
Customer Satisfaction	The department commits to Develop a checklist for customer feedback for 4 major value chains (poultry, mangoes, green grams and dairy (100%)
Application of service delivery Innovations	The department commits to improve service delivery through: - i) E-farming innovation: procure and distribute 30 tablets to extension managers (40%). ii) Facilitating10, 000 e-vouchers for Input acquisition by farmers (60%)
Resolution of Public Complaints	The department commits to: i) Maintain feedback suggestion boxes for the public (20%) ii) Implement procedures and guidelines for complain resolution (20%) iii) Receive and register complaints in the register (30%) iv) Resolve the complains and give feedback (30%) within a maximum of 30 days
Automation	The department commits to Improve the point to point internet link by upgrading equipment capacity from ubiquity nano station (low bandwidth short range) to (power beam M400) higher bandwidth long range (100%
C. INSTITUTIONAL TRANSFORMATION	
Development of County Planning	The department commits to; i) Prepare an extraction of a popular version of the strategic plan

Framework	(10%) ii) Evaluate the implementation of the strategic plan and prepare a report (40%) iii) Develop and implement annual departmental work plans based on strategic plan and core mandate with budget and timeliness (10%) iv) Ensure individual staff annual work plans are developed and implemented (30%) v) Evaluate work plan and staff performance (20%)
Youth Internships/ Industrial Attachments/ Apprenticeships	The department commits to involve 60 youths progressively in industrial attachment as follows: i) 26 Extension Service delivery ii) 6 Accounts / Procurement iii) 3 Agricultural Engineers iv) 6 Agribusiness / Marketing v) 9 Animal Health vi) 5 Agro Processing / Value Addition vii) 5 Fisheries
Access to Government Procurement Opportunities (AGPO)	The Department commits to involve youth, women and PLWDs in agricultural projects / activities and award at least 30% of Kes 44,000,000.00 = Kes 13,200,000.00 to AGPO procurement requirements by 30/06/2020. (100%)
Promotion of Local Content	The department commits to allocate and award at least 40% of the total value (Kes 44,000,000.00) =17,600,000.00 of the procurement budget for goods and services produced locally as provided in the annual procurement plan (100%)
Competence Development	The department commits to enhance skills and proficiencies of staff to improve institutional performance in Irrigation (2 No) and Fisheries (4 No) (100%)
Knowledge Management	The department commits to: - i) Categorize the knowledge and information base already identified in 2018/19 (50%) ii) Serialize, code and store the information and knowledge in the resource center (50%)
Work Environment	The department commits to i) Recruit 3 casuals on contract to enhance office tidiness and cleanliness (60%) ii) Develop and display statement prohibiting all forms of sexual harassment in work place (40%)
Safety and Security Measures	The department commits to secure (50 No) Motor bikes with locks and chains (100%).
Cascading of Performance Contracts	The department commits to: i) Fully cascade the 2019/20 PC (Performance Contract with 2 COs, the 2 directors, Chairman and CEO – MFPP and performance appraisal to 176 staff members (40%). ii) Submit quarterly performance reports for all staff (176) as per

	reporting schedule (60%)
D : CORE MANDATE	
FLAGSHIP PROJECTS	
a) Dairy Development	The department commits to: - i) Conduct TOT training on governance to Extension and Co-operative officers (40%) ii) Inseminate 2,000 cows (60%)
b) Integrated Grain Value Addition Development	The department commits to: - i) Install, equip, test and commission a 2MT/hour grain value addition and processing plant at Makindu (80%) ii) Identify, recruit and train staff to operationalize the facility (20%)
OTHER LIVESTOCK PROJECTS	
a) Feasibility study	The department commits to carry out marketing survey and structures for model poultry slaughter house at Kitise (100%).
b) Construction of Abattoir	The department commits to procure land for construction of Abattoir (100%).
c) Livestock Disease Control Programme	The department commits to: i) Carry out disease surveillance and reporting and publish quarterly bulletins (40%) ii) Vaccinate 55,000 No. of animals based on disease surveillance reports (60%)
d) Poultry Development	The department commits to; i) Enhance poultry production through procurement and distribution of 16,300 breeding stock/chicks to organized groups (60%) ii) Enhance capacity building in good husbandry practices to 3,260 beneficiaries (40%)
e) Fisheries Development:	The department commits to; i) Procure, install, train, and commission a pelletizer at ATC feed Centre at (30%) ii) Establish 6 fish demonstration farms in the 6 sub counties (30%) iii) Propagate 7,000 fingerlings at ATC modern hatchery (40%)
OTHER AGRICULTURE PROJECTS	
a) Horticulture – Fruit Value Chain Development	The department commits to procure and distribute; i) 36,000 improved avocado seedlings targeting 444 acres (50%) ii) 6,000 improved mango seedlings targeting 74 acres (50%)
b) Industrial crops development	The department commits to procure and distribute 9,778 improved Macadamia seedlings targeting 120 acres (100%).
1. **DONOR PROJECTS**	
a) ASDSP II	The department commits to implement ASDSP 2 work plan (100%)
b) NARIGP	The department commits to implement NARIGP work plan (100%)
c) KCEP CRAL	The department commits to implement KCEP CRAL work plan (100%)

d) SIVAP	The department commits to implement SIVAP work plan (100%)
e) SHEP PLUS	The department commits to implement SHEP PLUS work plan (100%)
f) MYAEP	The department commits to implement MYAEP work plan (100%)
OTHERS OPERATIONS	
a) Revenue Collection	The department commits to Generate Kes 8.3M revenue through; i) Facilitation of trade in livestock and livestock-products (Kes. 6.5M) (70%) ii) Agricultural Mechanization Services (Kes 1.0 M) (15%) iii) Agricultural Training Centre services (Kes 0.8 M) (15%)
b) Ease of Doing Business	The department commits to create conducive environment for doing business through timely: i) Inspection & licensing of 130 meat industry facilities (30%) ii) Issuance of 25 fish permits and licenses (10%) iii) Provision of AMS services – land preparation (400 acres) and 3800 hay bales (30%) iv) Processing of supplier's/contractor's payments (30%)
c) Compliance with Statutory Obligations	The department commits to comply with and enforce all relevant legislations/regulations through: i) Certification of foods of animal origin 68,000 sheep and goats 16,000 cattle carcasses (40%) ii) Train and provide manuals for global-GAP standards to 1000 farmers to access export market (40%) iii) Endorse six (6) contract farming agreements and monitor implementation (20%).
d) Project Completion Rate	The department commits to improve project completion rate from the current status of 85 % to 100% in the FY 2019/20.
e) ASK Show	The department commits to provide leadership in holding the Makueni ASK satellite show by: i) Proposing and constituting the show committees (20%) ii) Providing secretariat services including custody of minutes (30%) iii) Providing show catalogue to all other county departments and stakeholders (20%) iv) Compiling the final show report (30%)
CROSS-CUTTING ISSUES	
a) Prevention of Alcohol and Substance Abuse	The department commits to Recommend identified cases for rehabilitation, treatment and counselling to Human resource directorate (100%)
b) Prevention of HIV Infections	The department commits to i) Continue sensitization of staff on HIV (40% ii) Avail condom dispensers in strategic areas/Washrooms (60%)

c) Disability Mainstreaming	The department commits to implement Government policy on affirmative action for persons with disability by undertaking the following: i) Maintain disaggregated data by number, age, gender, placement and forms of disability for staff and individuals reached by departmental programmes (20%) ii) Ensure design improvements for ease of access (entry and exit) in offices, toilets (30%) iii) Submit quarterly reports using the prescribed format (20%)
d) Gender Mainstreaming	The department commits to continue implementing Government policy on affirmative action for gender mainstreaming through i) Disaggregating data during learning and reporting (60%) ii) Ensure gender representation during beneficiary targeting in various programmes (40%)
e) Corruption Prevention	The department commits to continue combating and preventing corruption, unethical practices and promote standards and best practices in the department through: - i) Sensitization of staff on corruption (30%) ii) Facilitating the Anti-Corruption committee to do its work (20%) iii) Maintenance of the suggestion boxes at Headquarter (30%) iv) Maintenance of strategically placed warning sign board in all departmental offices (20%)
f) National Cohesion and Values	The department commits to promote National Cohesion and Values through: - i) Open contracting/Tendering awarding (50%) ii) Use of official language (Kiswahili/English) (50%)
g) Environmental Sustainability	The department will i) Sensitize 12,000 farmers on climate smart agriculture, agroforestry, soil and water conservation & range management (20%) ii) Conduct EIA for eligible projects (30%) iii) Disseminate weather forecasting information before onset of rains (30%) iv) Promote conservation agriculture through partnerships with stakeholders (20%)

ANNEXES

Annex 1: ASDSP TARGETS 2019/20

Agriculture Sector Development Support Programme (ASDSP) 2019/2020			
Outcome 1: Productivity of priority value chains increased			
Performance area/key result area	**Key outputs**	**Performance Indicator**	**Annual target**
Outputs 1.1 capacity of existing service providers on identified opportunities enhanced	Enhance Capacity of existing service providers on identified opportunities	• No. of opportunities identified per value chain	15
Output 1.2 Innovation on identified opportunities promoted	Promote innovations/technologies	• No of innovations on identified opportunities promoted/implemented	5
Output 1.3: Environmental resilience for increased productivity among prioritized value chains strengthened	Enhance climate smart agriculture and green growth interventions, practices and strategies	• Number of Climate smart agriculture technologies identified • No. and type of Climate smart agriculture technologies in use	10 6
Outcome 2: Entrepreneurial skills of priority value chain actors strengthened			
Output2.1Entrpreneural skills of service providers enhanced	Establish a pool of agribusiness mentors and coaches for enhancing entrepreneurial skills of startup entrepreneurs and SMEs	• No. of service providers trained on entrepreneurial skills	18
Outcome 3: Access to markets by priority value chain actors improved			
Output 3.1 Market access linkage for priority Value chain actors improved	Improve Market Linkages	• No. of market linkage instruments signed and operational	9
Output 3.2.Access to market information by Value chain actors improved	Improve access to Market information	• No. of market information providers supported	6
Output 3.3. Access to Value chain financial services by Value chain actors improved	Improve Access to financial services	• Volume of financial services accessed and by type	20%
Outcome 4: Structures and capacities for consultation, cooperation and coordination in the sector strengthened			
Output 4.1. Initiatives for establishment of the structures for consultation and coordination supported	Support Establishment of structures for consultation and coordination	• Number and types of steering, coordination and management structures in place	6

Output 4.2. Capacities of the established structures for consultation and coordination enhanced	Enhance Capacities of the established structures for consultation and coordination	• No. of structures with operational instruments/work plan • % achievement of operational instruments implementation	5 20%
Output 4.3. Participation of stakeholders in consultation and coordination structures enhanced	Enhance Participation of stakeholders in consultation and coordination structures	• No. and type of stakeholders participating in coordination and consultation structures	12
Output 4.4 Sector policies, strategies, regulations and plans prepared and launched	Support preparation and launch of Sector policies, strategies, regulations and plans	• Number of policies inventoried and launched	5
Output 4.5 Enhancing monitoring, evaluation and communication for improved programme delivery and performance	Enhance M&E and communication for Improved programme delivery and performance	• M&E planning tools developed	2

Annex 2: KCEP CRAL TARGETS 2019/20

KCEP CRAL-Kenya Cereals Enhancement Programme Climate Resilient Agriculture Livelihood			
OBJECTIVES	KEY ACTIVITIES	INDICATORS	TARGETS
To contribute to reduction of rural poverty and food insecurity of smallholder farmers in the ASALs-	Developing the economic potential of target groups; -Improving natural resources management capacity; *and* -Building resilience to climate change in an increasingly fragile ecosystem	No. of issuance of farm inputs through e-voucher No. of farmers adopting the technologies	Total of 10,00 e-vouchers beneficiaries 3385farmers
	Empowerment of County Governments and beneficiary communities to sustainably manage the natural resource base and build resilience to climate change thro' community assets; Value chain and partnership-based both in	Capacity build farmers /and extension agents	

	design and implementation modalities (PPP) Nutrition Sensitive approach, promoting household food production, storage and consumption	No. of farmers issued with e-voucher inputs /capacity build No. of farmers issued with e-voucher inputs /capacity build	10,000 beneficiaries

Annex 3: NARIGP TARGETS 2019/20

Project: NARIGP-National Agricultural and Rural Inclusivity Growth Project			
Overall objective: To increase agricultural productivity and profitability of targeted rural communities in selected counties, and in event of an eligible crisis or emergency to provide immediate and effective response			
OBJECTIVE	**KEY PLANNED ACTIVITY**	**INDICATORS**	**TARGETS**
To finance community Micro-projects	Develop Micro-project proposals	No. of Micro-project proposals developed by CIGs &VMGs	273
	Approve Micro-project proposals	No. of Micro-project proposals approved by CDDCs	273
To enhance Community Level institutions' capacity to manage community resources	Undertake Participatory Contracting Workshop (PCW)	No. of participatory contracting workshops undertaken	1
To strengthened Producer Organizations	Link CIGs & VMGs to POs	Percentage of CIGs & VMGS linked to selected POs	70%
To Develop Value Chains	Develop VC upgrading action plans	No. of upgrading proposals developed & implemented	4
	Business to Business Meetings to Establish networks & linkages	Networks and linkages established	4
To enhance capacity of county technical departments	Undertake Capacity Needs Assessment (CNA)	No. of Capacity building plans developed	1
	Carry out & support short term technical assistance	No. of capacity Building Plans specialists per investment implemented	2

To implement Multi community investments	Workshop to identify unemployed youths and VMGs	No. of unemployed youths and VMGs identified	1000
	Finance & Implement approved investment proposals of multi-community Investments	No. Landscape wide investments implemented	1
To enhance project operations and management	Hold Periodic CTAC Meeting	No. of meeting held	6
	Conduct CTAC & CM&EA - Monitoring, Supervision & Backstopping project implementation Field Visits	No. of field visits conducted	6
	Prepare County AWP&Bs	No. of AWP&Bs prepared	1
To enhanced capacity on fiduciary management	Undertake Fiduciary Technical CDDC Training & Backstopping	No. of CDDCs trained	20
	Prepare quarterly interim financial reports	No. of Quarterly Interim Financial Reports prepared	4
	Undertake Semi-annual and annual financial audit	No. of Semi-annual and annual financial audit reports	2
To enhance compliance to ESS	Screening & Developing ESMP for Proposed projects	No. of projects screened & ESMPs developed	275
	Quarterly projects' field visits/audits on Implementation of ESMPs	No. of audits	4
To Establish Monitoring & Evaluation Structures	Training CDDCs on M&E structures	No. of Monitoring and Evaluation System Developed	20
	Undertake Field Data Collection/ Surveys / Studies	No. of wards involved	20
	Undertake Regular M&E		4

Annex 4: SIVAP TARGETS 2019/20

SIVAP- Small Scale Irrigation and Value Addition Project (SIVAP)			
Contribute to poverty reduction by enhancing agricultural productivity and income, and food security.			
Outcomes	**KEY ACTIVITIES/COMPONENTS**	**INDICATORS**	**TARGETS**
Enhanced Irrigation Infrastructures and Water Resources Development. 2) Improved Access to Markets and Strengthening Value Chains. 3) Institutional strengthening and capacity development.	a) Survey and design of water harvesting structures in Muoni/Kikuu catchment	Designs developed (reports)	16
	b) Environmental and Social Impact Assessment (ESIA)	Reports	16
	c) Contracting of sites for construction of structures for water harvesting	Reports	16
	d) Contracting of utangwa irrigation scheme	Report on contractor being on site	1
	e) Redesigning of Kyee Mwee irrigation scheme	Report	1