CAPACITY BUILDING INITIATIVES AND MAIZE PRODUCTION PERFORMANCE AMONG SMALLHOLDER FARMERS; A CASE STUDY OF RESILIENCE AND LIVELIHOOD PROJECT IN OYAM DISTRICT

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A RESEARCH DISSERTATION SUBMITTED TO THE FACULTY OF BUSINESS AND DEVELOPMENT STUDIES AS PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF A MASTER'S DEGREE OF MONITORING AND EVALUATION OF GULU UNIVERSITY

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DECLARATION

I, Adongo Caroline, with registration number 23/U/0431/MME/PS, hereby declare that the research dissertation work entitled ***"Capacity Building Initiatives and Maize Production Performance among Smallholder Farmers; A Case study of Resilience and Livelihood Project in Oyam District"*** is entirely my own and has not been published or presented in any other form.

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APPROVAL

This research dissertation titled ***"Capacity Building Initiatives and Maize Production Performance among Small Holders' Farmers; A Case study of Resilience and Livelihood Project in Oyam District"*** has been thoroughly reviewed and approved.

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DEDICATION

I dedicate this study to my dear daughter Kylie Amaro Gabriella who has motivated me to work hard and to my dear parents Mr. Obura Geoffrey and Mrs. Lilly Obura and my siblings Jane, Moses, Kenneth, Brenda, Gloria, Joshua, Daniel and Gerald for their support and encouragement throughout my studies.

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ABSTRACT

This study examined the influence of capacity-building initiatives on maize production performance among smallholder farmers in Oyam District, Uganda. Specifically, it assessed the nature of capacity-building efforts, evaluated maize production outcomes, explored the link between capacity building and performance, and considered how environmental factors shaped this relationship. A descriptive cross-sectional design was adopted, employing both qualitative and quantitative approaches. Data were collected from 157 respondents, including 138 smallholder maize farmers, 05 extension workers, 10 local leaders, and 04 NGO representatives, using surveys, key informant interviews, and focus group discussions. Quantitative data were analyzed using SPSS Version 25, applying descriptive statistics and correlation and regression analysis, while qualitative data were examined through thematic content analysis. The findings reveal that farmers' capacity building is positively correlation to farmers' capacity building and maize production performance. Farmers' capacity building is strongly associated with maize production performance, with training and peer learning emerging as the most influential factors compared to mentoring alone. The study found that environmental factors do not moderate the relationship between farmers' capacity building and maize production performance. In conclusion, capacity-building initiatives have made a clear and lasting contribution to maize farming outcomes in Oyam District. Farmers who participated in these programs adopted more effective practices, gained confidence, and improved resilience, though broader support and policy alignment are needed to address persistent environmental and market challenges. The study recommends that smallholder farmers, NGOs, government, extension workers, and local leaders should work together to expand practical, decentralized training, strengthen farmer groups, and improve access to quality inputs, credit, and markets. Continued investment in rural infrastructure, strong extension services, and coordinated field demonstrations will support consistent learning and adoption of improved agronomic and climate-smart practices across all communities.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This study investigated the influence of capacity-building on maize production performance among smallholder farmers in Oyam District. Although existing literature widely explores the impact of agricultural capacity-building initiatives on smallholder farmers emphasizing training, extension services, and technology adoption in enhancing maize production most of these studies are conducted at national or regional levels, with limited empirical evidence specific to Oyam District.

Maize production is a key factor in Uganda's agricultural sector, significantly impacting food security, household incomes, and national economic stability. Despite its importance, smallholder farmers in Uganda continue to face low maize yields. In response, various non-governmental organizations have implemented capacity-building initiatives to equip farmers with the necessary skills, knowledge, and resources to enhance productivity (Diiro et al., 2018). The Resilience and Livelihood Project by World Vision is one of the interventions aimed at strengthening smallholder farmers' capacity to improve maize production and economic resilience in Oyam District. This study therefore sought to investigate the influence of farmers' capacity-building and maize production performance among smallholder farmers using the resilience and livelihood project by World Vision in Oyam District as a case.

This dissertation is structured into six chapters: Chapter One provides the foundation of the study, covering the background of the study, problem statement, purpose of the study, scope of the study, significance of the study, and the conceptual framework. Chapter Two presents the literature review, offering relevant insights and context for the research. Chapter Three outlines the methodology used to conduct the study. Chapter presents the presentation of the results. Chapter 5 presents the discussion of the results and then Chapter six presents the conclusion and recommendations of the study.

1.1 Background of the study

Capacity building as an important strategy for increasing maize production refers to the process of improving the skills, knowledge, and resources of farmers to enhance their ability to manage their agricultural activities more effectively and sustainably (Woltering et al., 2022). This

approach aims to equip farmers with the tools, techniques, and support they need to increase productivity, adapt to changing environmental conditions, and ultimately improve their livelihoods (Belasco et al., 2023). Maize production to refers to the overall effectiveness and efficiency of maize farming in terms of the quantity and quality of maize produced over a specific period or on a particular area of land (Mutuku et al., 2020). Smallholder farmers are individuals or families who manage small plots of land, typically less than two hectares, using primarily family labor and limited resources. They are most commonly found in regions such as Sub-Saharan Africa, South Asia, Southeast Asia, and Latin America. These farmers usually grow a variety of crops including Maize and sometimes raise livestock, focusing on producing food for their own households and local markets rather than for large-scale commercial purposes. With limited access to modern farming inputs, credit, technology, and markets, smallholder farmers often face significant challenges (Carelsen et al., 2021; Grote et al., 2021; Mastenbroek et al., 2024; Obura et al., 2020). Despite this, the smallholder farmers play a critical role in ensuring food security, supporting rural livelihoods, and contributing to local economies, especially in developing countries.

Maize (Zea mays) is one of the most widely cultivated cereal crops globally and serves as a staple food for millions of people. It is grown on approximately 197 million hectares across the globe, with a production output of over 1.2 billion metric tons annually (Erenstein et al., 2022). The crop's versatility allows it to be utilized for various purposes, including food, feed, and industrial applications (Ranum & Pe, 2014). In recent decades, maize has emerged as a critical crop for food security, particularly in developing regions (Erenstein et al., 2022).

Africa accounts for about 7% of the global maize production but is highly dependent on the crop as a staple food source for its rapidly growing population (Santpoort, 2020). Maize occupies a significant share of the cultivated land in Sub-Saharan Africa (SSA) and contributes to approximately 30% of the caloric intake in the region (Snapp et al., 2018). Despite its importance, maize yields in Sub-Saharan Africa remain significantly lower than the global average due to various factors, including poor soil fertility, limited access to improved seeds, inadequate fertilizer use, and erratic rainfall patterns.

In Uganda, maize is an important crop for food security and income generation. It is the second-most cultivated crop after bananas and accounts for a substantial share of both household and national income (Ndoye et al., 2023). The country produces approximately 2.7 million metric tons of maize annually, with smallholder farmers contributing more than 80% of the total output

(Snapp et al., 2018). However, productivity remains low, with an average yield of 2.0 tons per hectare compared to the potential yield of 5.0 tons per hectare (Status, 2020). The adoption of drought-tolerant maize varieties and improved agronomic practices could significantly enhance maize production in Uganda (Suganya et al., 2020). However, challenges such as limited access to agricultural inputs, pest and disease infestations, and post-harvest losses hinder progress.

Oyam District, located in the Northern Region of Uganda, exemplifies the broader trends and challenges of maize production in the region. The district relies heavily on maize as a staple crop and a source of income for its predominantly agrarian population. However, maize productivity in Oyam is constrained by factors such as poor access to agricultural inputs, limited adoption of modern farming technologies, and climate variability. Addressing these challenges requires targeted interventions, including the dissemination of improved maize varieties, investment in irrigation infrastructure, and strengthening extension services to support smallholder farmers (Ojo et al., 2021). Addressing low maize productivity requires a complex approach, including the development of improved maize varieties, the adoption of innovative farming techniques, and the strengthening of farmers' organizations. Research efforts, such as those by the National Agricultural Research Organization (NARO) and the International Maize and Wheat Improvement Center, have led to the creation of high-yielding, stress-tolerant maize hybrids. These advancements have significantly improved grain yields, with an annual genetic gain of 2.25%, equivalent to an increase of 81 kg per hectare (Asea et al., 2023). In conclusion, improving maize production in Oyam District requires better access to agricultural inputs, improved farming technologies, and stronger agricultural extension services.

Smallholder maize farmers in sub-Saharan Africa continue to face persistent challenges related to low productivity, which undermines food security and household incomes. Despite the strategic importance of maize in both national and regional food systems, yields remain far below global averages. Santpoort, (2020) notes that while policies have encouraged the expansion of maize cultivation, they often fail to address the structural barriers faced by smallholder farmers, such as limited access to quality inputs, weak extension services, and inadequate market infrastructure. Kotu et al., (2022) further emphasize that the adoption of sustainable intensification practices among smallholders is constrained by mismatched support systems and a lack of context-specific solutions. As a result, many smallholder farmers remain locked in cycles of low productivity and vulnerability. According to Bizikova et al., (2020),

addressing these challenges requires an integrated approach that enhances farmers' access to knowledge, finance, and markets factors that directly influence their capacity to improve productivity. However, as Agole et al., (2022) argue, even collective initiatives like farmer groups are not always effective without targeted interventions aimed at strengthening institutional support and addressing the specific performance gaps that smallholders face.

The Resilience and Livelihood Project by World Vision, which began around 2008. The project is designed to help families meet their basic needs, manage crises, and gain better access to essential health and education services. It promotes climate-smart agricultural practices and modern farming technologies, equipping households with the knowledge and skills needed to adopt sustainable livelihood strategies and build economic resilience. A core aspect of the project is human capacity-building. Farmers receive training to improve their technical skills, financial literacy, and access to markets. The project places a strong emphasis on boosting agricultural productivity especially in maize production with the goal of improving food security, increasing household incomes, and creating economic opportunities for smallholder farmers in the district. These efforts are aligned with World Vision's broader goal of breaking the cycle of intergenerational poverty by 2030, ensuring that vulnerable children are raised in stable, self-reliant households (World Vision, 2021). Through training, improved seed distribution, access to extension services, and stronger market linkages, the project empowers smallholder farmers to increase yields and build long-term resilience. Maize productivity remains a critical factor in food security and economic development at global, regional, and local levels. Although there have been notable advancements in maize research and development, significant gaps remain particularly in addressing the needs of smallholder farmers in areas like Oyam District. This project was selected for this study because it is the only initiative within World Vision that specifically focuses on improving household livelihoods in Oyam District, particularly among smallholder farmers. It is against this background that the researcher chose to focus on this project for the study.

1.2 Problem Statement

Maize production performance in Uganda remains significantly below its potential, with average yields estimated at 1.5 tons per hectare compared to a potential of over 5 tons per hectare (Nkuba et al., 2020). Smallholder farmers, who form the backbone of maize production, face numerous challenges, including limited access to quality inputs, poor agronomic practices, and inadequate postharvest management (Kugonza, 2022). Climate variability, particularly recurrent droughts, exacerbates yield instability, making maize production vulnerable to weather shocks. Postharvest losses due to poor handling and storage practices significantly reduce farmer incomes and food availability (Ariong et al., 2023; Epule et al., 2017).

The Government of Uganda has made several efforts through initiatives like the Parish Development Model to boost maize production by providing improved inputs, affordable credit via SACCOs, rural infrastructure, and organizing farmers into cooperatives supported by extension services and data-driven planning. Complementing these efforts, NGOs such as World Vision have implemented projects promoting good agricultural practices, drought-tolerant seeds, and climate-smart agriculture (Nelson et al., 2024). Despite these interventions, smallholder farmers still face challenges in accessing financial resources, extension services, and competitive markets, limiting the sustainability of maize production (Bagamba et al., 2023).

In Northern Uganda, maize production performance constraints are intensified by low adoption of modern farming techniques, poor soil fertility, and weak market linkages. The region faces limited infrastructure, which affects both input availability and market access. According to Menya et al., (2023), rural Uganda's lack of reliable seed systems hinders the affordability and accessibility of high-quality maize seeds. Many farmers rely on saved seeds, which lack genetic life, leading to declining yields (Ariong et al., 2023). There is limited evidence on how farmers' capacity-building initiatives influence maize production performance among smallholder farmers in the region, this study therefore sought to investigate the influence of farmers' capacity-building on maize production performance among smallholder farmers involved in the Resilience and Livelihood Project by World Vision in Oyam District.

1.3 Purpose of the Study

This study aimed to investigate the influence of capacity-building on maize production performance among smallholder farmers in Oyam District.

1.3.1 Specific Objectives of the Study

i. To asses capacity building initiatives among smallholder farmers of Oyam District.
ii. To assess maize production performance among smallholder farmers in Oyam District.
iii. To evaluate the influence of capacity-building initiatives on maize production performance among smallholder farmers in Oyam District.
iv. To examine the moderating effect of environmental factors on the relationship between capacity building and maize production performance among smallholder farmers of Oyam District.

1.3.2 Research Questions

i. What are the capacity building initiatives among smallholder farmers of Oyam District?
ii. What is the current state of maize production performance among smallholder farmers in Oyam District?
iii. How does capacity building impact maize production performance among smallholder farmers in Oyam District?
iv. How do environmental factors moderate the relationship between capacity building and maize production performance among smallholder farmers in Oyam District?

1.4 Scope of the Study

1.4.1 Content Scope

The study covered contents on capacity-building and maize Production. The Study covered areas on the influence of the training programs on maize production performance, the current maize production performance levels, the capacity building initiatives and the moderating effect of environmental factors on the relationship between farmers' capacity building and maize production performance among smallholder farmers.

1.4.2 Geographical Scope

The study was carried out in Oyam District, located in the Northern Region of Uganda. The district covers an area of approximately 3,276 square kilometers, with a population density of about 140 persons per square kilometer. The district is divided into Seven (07) administrative Sub-Counties, namely: Acaba, Aber, Minakulu, Ngai, Otwal, Loro, and Aber. The study covered 02 Sub-Counties of Minakulu and Aber in Oyam district where the Resilience and Livelihood Project is implemented by World Vision Uganda.

1.4.3 Time Scope

The time scope of this study was from 2019 to 2024. This five-year period was chosen to allow for a thorough evaluation of how capacity-building interventions have influenced maize production among smallholder farmers in Oyam District over the years. The study examined trends in maize yield, farmer satisfaction, and household income within this period and assessed how the implementation of capacity-building initiatives affected these outcomes.

This time frame is justified for several reasons. First, it coincides with major agricultural capacity-building programs introduced or scaled up in the district, including government and NGO initiatives focused on improving farmer knowledge, input use, and adoption of climate-smart practices. Second, the period provides sufficient time to observe measurable changes in farmer productivity and skill application resulting from these interventions. Third, reliable data sources such as district agricultural records, NGO reports, and monitoring and evaluation documents are consistently available from 2019 onward, supporting accurate analysis. Finally, this five-year span captures multiple production cycles and reflects recent shifts in climatic patterns, market conditions, and policy developments that have shaped maize production in the area.

1.5 Significance of the Study

This study is significant for its contributions to scholarly research, agricultural practice, and policy development.

From a scholarly perspective, the study expands existing knowledge on the relationship between human capacity-building interventions and maize productivity among smallholder farmers. It provides empirical evidence from Oyam District, which adds a local dimension to broader discussions in agricultural extension, rural development, and productivity improvement. By examining both the outcomes and processes of capacity-building programs, the study contributes to understanding how farmer training, knowledge transfer, and resource access influence agricultural performance. The findings will serve as a useful reference for researchers seeking to explore similar interventions in other regions or crop systems, thereby enriching the literature on sustainable agriculture and rural capacity development.

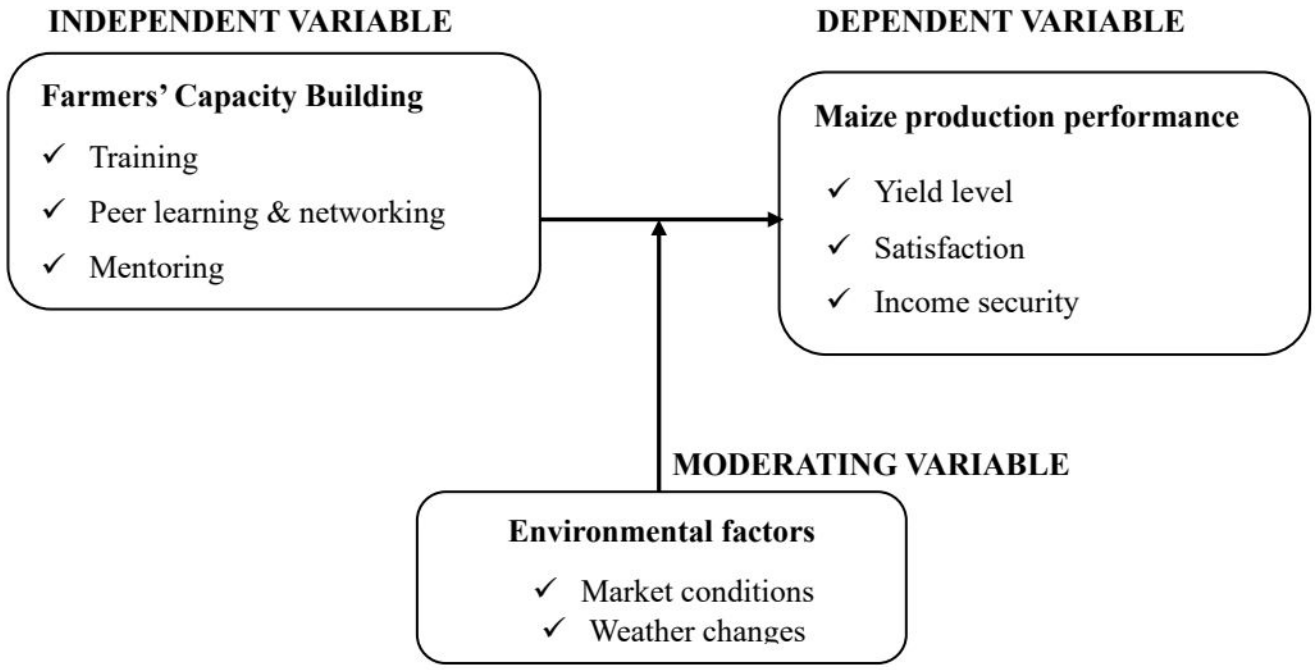
In terms of practical application, the study offers actionable insights for agricultural extension officers, NGOs, and development practitioners. The results highlight which capacity-building strategies are most effective in improving farmers' technical skills, adoption of improved practices, and productivity levels. This knowledge can help practitioners design and implement

more targeted and efficient training programs, strengthen farmer support systems, and optimize resource utilization to achieve better outcomes.

Regarding policy relevance, the study provides evidence-based guidance for government agencies and policymakers involved in agricultural planning and rural development. By identifying the key factors that shape maize productivity, the research can inform the design of more responsive and inclusive agricultural policies. These may include capacity development frameworks, input distribution programs, or incentive structures that promote knowledge-based farming and long-term productivity growth. The findings can also support the alignment of local agricultural policies with national food security and rural transformation goals.

Overall, the study contributes to the advancement of agricultural knowledge, enhances professional practice among stakeholders, and supports evidence-driven policymaking aimed at improving the livelihoods of smallholder farmers in Oyam District and similar settings.

1.6 Conceptual framework



Source: Adapted from Ariong et al., (2023)

Figure 1 Showing the conceptual framework

The conceptual framework illustrates the relationship between farmers' capacity-building and maize production performance, with environmental factors moderating this relationship. Farmers' capacity-building which is the independent variable, includes training, peer learning

and networking, and mentoring, all of which are aimed at enhancing the knowledge, skills, and support systems of smallholder farmers. These interventions are expected to influence maize production performance which is the dependent variable measured in terms of yield level, farmer satisfaction, and income security. However, this relationship does not occur in isolation, as environmental factors such as market conditions and weather changes may either strengthen or weaken the effect of capacity-building on production outcomes.

1.7 Operational definitions of the key terms

Framers' capacity-building

This refers to the process of improving the skills, knowledge, and resources of farmers to enhance their ability to manage their agricultural activities more effectively and sustainably. This approach aims to equip farmers with the tools, techniques, and support they need to increase productivity, adapt to changing environmental conditions, and ultimately improve their livelihoods.

Maize production performance

This refers to the overall effectiveness and efficiency of maize farming in terms of the quantity and quality of maize produced over a specific period or on a particular area of land.

Small holder farmers

Smallholder farmers are individuals or households engaged in agricultural production on relatively small plots of land, typically ranging from less than one hectare to a few hectares. They primarily rely on family labor for farming activities and often practice mixed cropping for both subsistence and income generation. Smallholder farmers generally have limited access to modern inputs, credit facilities, extension services, and markets, which makes their productivity and livelihoods highly vulnerable to economic and environmental shocks.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents a comprehensive review of existing literature concerning farmers' capacity building and its influence on maize production performance among smallholder farmers in Oyam District. Specific attention is given to theoretical review, dimensions of farmers' capacity building, aspects of maize production performance, and the influence of access to finance and availability of land on maize production performance.

2.1 Theoretical Framework

This study was grounded on two theories that included the human capital theory and the economic theory.

2.1.1 Human Capital Theory

This study was supported by human capital theory. This theory was pioneered by Schultz (1961) and further developed by Becker, (1975), who defined human capital as the knowledge, skills, and abilities that individuals acquire through education, training, and experience. This form of capital is akin to physical and financial capital in its capacity to generate economic returns, both for individuals and for society at large. Becker, (1975) argued that human capital is a critical determinant of productivity and income levels, asserting that investments in education and training result in increased labor market efficiency and higher earnings. This theory provides a framework for understanding how investments in human abilities, education, and skills contribute to economic growth and productivity.

Human Capital Theory operates on several key assumptions that frame its understanding of productivity and economic growth. First, it assumes that individuals and organizations invest in education, training, and skill development to enhance productivity and income potential, as emphasized by Becker, (1975) and Muhsam & Becker, (1965). Second, the theory presumes that these investments yield measurable economic returns, including higher earnings for individuals and increased efficiency for organizations, which Blaug, (1976) empirically validated through studies on education and productivity. Third, it assumes that individuals are rational decision-makers who evaluate the costs and benefits of investing in their skills to maximize lifetime income, a perspective also supported by Finis, (1975). Fourth, the theory

suggests that differences in human capital, such as levels of education, experience, and skills, are significant determinants of income inequality and labor market outcomes, as highlighted by STROBER, (1990). Furthermore, it assumes that the benefits of education and training are transferable across sectors, contributing universally to economic growth and efficiency, as discussed by Nafukho et al., (2004) and Scott, (1996). However, critics such as Marginson, (2019) argue that these assumptions often neglect non-economic factors, including cultural, social, and institutional influences, which play a crucial role in shaping human behavior and productivity. However, the theory has faced criticism for its narrow focus on economic outcomes, as highlighted by Marginson, (2019), who argued that it overlooks broader social and cultural dimensions of human development, including equity and justice. Despite these limitations, Human Capital Theory remains a cornerstone of economic thought in understanding the link between education and productivity.

Human Capital Theory provides a compelling lens to analyze how investments in farmers' capacity building impact maize production performance, particularly among smallholder farmers. In the context of capacity-building efforts in Oyam District, the theory highlights the transformative potential of equipping farmers with agricultural knowledge, including sustainable farming practices, resource management, and improved maize production techniques, as emphasized by Becker, (1975). This aligns with findings by Hoang-Khac et al., (2022), who demonstrated that such investments significantly enhance technical efficiency in food crop production. Bridging the gap between agricultural research and practical application, as noted by Donnet et al., (2012), enables farmers to adopt innovative practices, improve resource utilization, and achieve higher yields. In areas where climate variability poses significant challenges, capacity-building initiatives focusing on education and training equip farmers with skills to implement climate-resilient practices, ensuring sustainable productivity and food security, as highlighted by Lipton, (2012). Beyond immediate gains, such initiatives contribute to long-term socioeconomic development, including poverty alleviation and resilience (Nafukho et al., 2004). Overall, Human Capital Theory emphasizes the critical role of education, skills, and knowledge in transforming maize productivity and advancing sustainable livelihoods in Oyam District.

2.1.2 Economic theory

This study was also based on Economic Theory, which explained how individuals and producers allocated scarce resources to maximize production, efficiency, and economic returns. Studies by Becker, (2017), Mundlak, (2000) and Ekelund Jr & Hébert, (2013) provided broader

economic perspectives on resource allocation, productivity, and economic decision making. In agriculture, economic theory explained how farmers combined land, labour, seeds, fertilizers, capital, and knowledge to achieve improved production outcomes. A study by Smale et al., (1995) demonstrated the importance of farmers' economic circumstances in adopting improved maize varieties and agricultural technologies, while Oladejo & Adetunji, (2012) highlighted the importance of production costs, output, and profitability in maize farming.

A major strength of economic theory was that it provided a basis for understanding the relationship between agricultural inputs, farmers' decisions, production efficiency, and economic returns. It also explained how improved knowledge, appropriate technologies, and efficient resource utilization could contribute to increased maize productivity. A study by Capellesso et al., (2016) examined the economic and environmental implications of different maize production systems, while Stiglitz & Hoff, (2001) highlighted how imperfect information, market failures, and institutional constraints influenced economic decisions. However, economic theory did not fully explain the social, cultural, and environmental factors affecting farmers' performance. Furthermore, improved knowledge and technology did not necessarily translate into higher production when farmers lacked essential inputs, credit, or access to markets (Mundlak, 2000; Niehans, 1989).

In this study, Economic Theory guided the assessment of how capacity building initiatives influenced maize production performance among smallholder farmers under the Resilience and Livelihood Project in Oyam District. It helped explain how training, demonstrations, and agricultural extension services strengthened farmers' ability to select improved maize varieties, prepare land, apply fertilizers appropriately, manage pests and diseases, and adopt recommended planting and harvesting practices. These practices were expected to improve maize yields per hectare, increase total maize output, reduce production losses, and enhance profitability through more efficient use of farm resources. The theory also helped examine how access to agricultural inputs, labour, credit, and markets affected farmers' ability to translate the knowledge and skills acquired through capacity building into improved maize production.

2.2 Capacity building initiatives

Capacity building initiatives among smallholder farmers refer to structured efforts aimed at enhancing the knowledge, skills, attitudes, and practices of farmers to improve their productivity, adaptability, and resilience within the agricultural sector. These initiatives are central to empowering smallholders to adopt innovative farming techniques, respond

effectively to climatic and market challenges, and engage meaningfully in agricultural value chains (Kalimba & Culas, 2020; Kumari & Khanduri, 2019; Mekonnen et al., 2024). Key components of capacity building include training, which imparts technical knowledge and modern agricultural practices; peer learning and networking, which facilitate the exchange of experiences and innovations through farmer groups or cooperatives; and mentoring, which provides personalized guidance and ongoing support from experienced practitioners or extension agents (Bizikova et al., 2020; Izuchukwu et al., 2023; Sutherland & Marchand, 2021). These elements collectively contribute to building a robust foundation for sustainable and inclusive agricultural development among smallholder farmers.

2.2.1. Training

Training is widely recognized as the cornerstone of capacity building among smallholder farmers, equipping them with technical, organizational, and entrepreneurial skills. According to Kumari & Khanduri, (2019), structured training empowers farmers by enhancing their understanding of agronomic practices, resource management, and market dynamics. Kalimba & Culas, (2020) further emphasize that climate-focused training delivered through agricultural extension plays a vital role in strengthening adaptive capacities in Sub-Saharan Africa, particularly in managing droughts, floods, and pests. Mwadzingeni et al., (2025) demonstrate that farmers who participated in continuous training, especially when supplemented with coaching, were more likely to innovate and adopt new technologies such as precision agriculture and drought-resistant varieties.

Moreover, Woltering et al., (2022) highlight that capacity development through training becomes more effective when delivered at multiple levels individual, organizational, and systemic. This holistic training structure enables farmers to contextualize their learning and link it with broader policy and market environments. Li et al., (2024) similarly stress the necessity of an enabling environment that aligns training programs with institutional support, access to extension services, and inclusive agricultural policies. Complementing these insights, Landicho & Ramirez, (2023) report that participatory and adaptive training methodologies are particularly effective in Southeast Asia, where ecological diversity necessitates flexible learning approaches. Together, these studies underscore that training must not only transfer knowledge but also build confidence, stimulate critical thinking, and promote systems-level engagement among smallholder farmers.

2.2.2. Peer Learning and Networking

Peer learning and networking foster farmer-to-farmer knowledge exchange, which is often more relatable and practical than top-down extension approaches. Sutherland & Marchand, (2021) observe that on-farm demonstrations and peer-to-peer discussions offer experiential insights that accelerate the uptake of sustainable practices. In a similar vein, Izuchukwu et al., (2023) found that farmer-to-farmer communication networks significantly enhance the adoption of climate-smart agriculture and organic farming practices in several African contexts. Silvert et al., (2022) add that the success of such peer networks is often rooted in strong social capital trust, norms, and reciprocal relationships that facilitate collaborative learning and community-wide diffusion of innovations.

Turner et al., (2021) introduce the concept of "farmer champions," who serve as local role models and actively disseminate knowledge, thereby catalyzing broader community engagement. Their findings indicate that farmers are more likely to trust and emulate practices demonstrated by fellow farmers than those introduced by external agents. Bizikova et al., (2020) also argue that peer learning is significantly enhanced through structured farmer organizations and cooperatives, which not only support knowledge sharing but also serve as platforms for collective input procurement, marketing, and lobbying. Landini, (2021) extends this discourse by noting that even rural extension agents heavily rely on peer learning to remain current with evolving agricultural practices, thus reinforcing a culture of continuous knowledge exchange.

Networking further provides opportunities for smallholders to engage in collaborative problem-solving and co-create localized solutions. Nicol & Taherzadeh, (2020) emphasize that working cooperatively within networks allows farmers to challenge systemic inequalities and build food systems that are both just and sustainable. The convergence of these findings affirms that peer learning and networking are not peripheral but central to strengthening farmer capacity through horizontal knowledge transfer, contextual relevance, and collective empowerment.

2.2.3. Mentoring

Mentoring offers a sustained, personalized, and trust-based approach to farmer capacity development, particularly in areas requiring complex decision-making and behavioral change. According to Prasad, (2019), mentorship has been instrumental in advancing the Farmer Producer Organization movement in India by nurturing leadership and managerial capabilities

among rural farmers. Bisht et al., (2020) similarly highlight the role of mentoring in transforming subsistence agriculture into commercially viable enterprises, especially in contexts where smallholder farmers are integrating into value chains. Siaw et al., (2024) provide further evidence from West Africa, noting that women farmers who received ongoing mentorship demonstrated greater confidence, decision-making power, and participation in community-based agricultural projects.

Silici et al., (2021) emphasize that mentoring enhances farmers' adaptive capacity by deepening their understanding of why certain practices work, thus promoting more thoughtful and committed engagement with new methods. This aligns with the findings of Van Loon et al., (2020), who argue that mentoring is particularly important during the adoption of agricultural mechanization, where one-on-one guidance helps minimize operational errors and builds user confidence. Mekonnen et al., (2024) add that long-term mentoring is crucial for building resilience in food systems, as it facilitates the continuous development of strategic thinking and innovation among smallholder farmers.

Mentoring also serves as a mechanism for institutionalizing knowledge and practices within farmer groups and agricultural organizations. Manju et al., (2024) argue that without structured mentorship, capacity-building initiatives risk knowledge erosion and sustainability gaps. Landicho & Ramirez, (2023) support this claim by showing that mentorship-based extension strengthens both the individual and institutional dimensions of adaptive capacity. The body of evidence thus confirms that mentoring is not merely an add-on to training but a pivotal component in sustaining the transformation of smallholder farming systems through personalized guidance, leadership development, and embedded learning.

2.3 Maize production performance among smallholder farmers

Maize production plays a fundamental role in the livelihoods of smallholder farmers across sub-Saharan Africa, serving as a primary source of food, income, and employment. Its significance is underscored by the crop's wide cultivation and contribution to both household sustenance and national food security (Falconnier et al., 2020; Ibitola et al., 2019). However, despite its centrality in smallholder farming systems, maize production performance remains constrained by a myriad of challenges, including climate variability, limited access to inputs, low adoption of improved technologies, and suboptimal farming practices (Hlatshwayo et al., 2023; Ichami et al., 2019). The evaluation of maize production performance, therefore, requires a multidimensional approach that captures key performance indicators such as yield level,

farmer satisfaction, and income security. Yield level provides insights into physical productivity per unit of land; satisfaction reflects farmers' experiences with maize varieties, extension services, and market support (Bahtiar et al., 2023; Worku et al., 2020); while income security assesses the economic stability and resilience derived from maize farming (Abokyi et al., 2020).

2.3.1. Yield Level

Maize yield level is widely recognized as a primary indicator of production performance and food security among smallholder farmers. According to Tandzi & Mutengwa, (2020), accurate estimation of maize yield per harvest area plays a critical role in monitoring productivity levels and guiding agricultural policy and interventions. Yield is, however, influenced by a combination of biophysical and socio-economic factors. Ichami et al., (2019) demonstrated that nitrogen use efficiency and site-specific fertilizer recommendations are significant contributors to yield optimization on smallholder farms. In the same vein, Falconnier et al., (2020) established through simulation models that low nitrogen input, coupled with climate variability, severely restricts yield potential in sub-Saharan Africa. Worku et al., (2020) supported this view, showing that new stress-tolerant and climate-resilient maize hybrids significantly increased yields under rainfed conditions.

Furthermore, Bahtiar et al., (2023) noted that the promotion and adoption of new hybrid maize varieties in Indonesia had a substantial positive effect on yield levels, especially when accompanied by extension support. Similarly, Gebre et al., (2021) found that smallholder farmers in Tanzania who adopted improved stress-tolerant maize varieties achieved notable yield increases. Despite these advances, Hlatshwayo et al., (2023) pointed out that persistent challenges related to soil degradation, poor access to quality inputs, and erratic rainfall patterns continue to constrain yield improvements in rural South Africa. This highlights the need for integrated approaches that combine genetic innovations with improved agronomic and soil fertility management practices to sustainably boost maize yields.

2.3.2. Farmer Satisfaction

Farmer satisfaction in maize production is complex, encompassing agronomic outcomes, economic benefits, and the broader production environment. Bahtiar et al., (2023) argued that farmers' satisfaction is significantly linked to the availability and performance of improved maize varieties, as well as institutional support from government and agricultural input providers. Sinyolo, (2020) further emphasized that farmer satisfaction increases when

households achieve greater food availability and stability, particularly through the adoption of improved maize varieties that are more resilient to climate shocks. Moreover, Meador & O'Brien, (2019) observed that maize producers in Rwanda experienced greater satisfaction when engaged in well-functioning cooperatives, which provided both social empowerment and economic benefits. Such institutional arrangements often enhance trust, access to inputs, and collective marketing, thereby improving the overall production experience.

Wahab et al., (2022) noted, however, that satisfaction is also sensitive to market dynamics and yield variability. Their study in Ghana revealed that many farmers expressed frustration with low and inconsistent prices, as well as uncertainty in yield outcomes, leading to reduced enthusiasm for maize farming. Worku et al., (2020) similarly found that despite the promising yields of new hybrids, farmers' overall satisfaction depended on the availability of markets and reliable information on agronomic practices. Thus, while technological improvements are important, they must be complemented by strong institutional and market support to ensure sustained satisfaction among maize growers.

2.3.3. Income Security

Income security derived from maize farming is essential for the economic stability of smallholder households, particularly in rural areas where alternative income sources are limited. Abokyi et al., (2020) highlighted the positive impact of maize output price support policies in Ghana, demonstrating that consistent and favorable pricing can significantly enhance income security for farmers. Similarly, Olounlade et al., (2020) found that participation in contract farming in Benin improved household incomes and food security by ensuring access to reliable buyers and fair prices. These findings are echoed by Ogunniyi et al., (2021), who stressed that income security is shaped by a combination of factors, including access to education, extension services, land ownership, and input availability.

Furthermore, Olagunju et al., (2021) showed that cooperative membership increased maize farmers' access to credit and markets, thereby stabilizing income and enhancing resilience against external shocks. Mutuku et al., (2020) noted that the integration of conservation agriculture and soil fertility practices not only improved yields but also reduced input costs, resulting in higher net incomes for smallholders in Kenya. In a related study, Gebeyehu, (2023) reported that conservation agriculture adoption contributed to increased maize-based incomes, particularly by minimizing production risks and enhancing productivity. Despite these gains, Obi & Ayodeji, (2020) revealed that South African smallholder farmers still face constraints

related to land size, capital, and access to quality inputs, which limit their ability to translate maize production into sustained income security. These insights underscore the importance of supportive policies, institutional frameworks, and sustainable practices in promoting income security through maize production.

2.4 Capacity building initiatives and maize production performance

Capacity building is a vital component for improving maize production performance among smallholder farmers. This capacity building includes training, peer learning and networking, and mentoring, all of which directly influence key indicators of production, such as yield levels, satisfaction, and income security. Several studies highlight that capacity-building programs, particularly those that focus on training, have a significant impact on improving farming practices. Ibitola et al., (2019) found that training in better crop management techniques, pest control, and soil fertility management leads to increased maize yields, while Kapari et al., (2023) argued that enhancing the technical skills of farmers through training is essential for improving both productivity and long-term sustainability. Moreover, Othieno et al., (2021) emphasize that training programs must be context-specific to the challenges farmers face, ensuring that the knowledge provided is directly applicable to the local environment, thereby improving satisfaction and fostering a greater sense of accomplishment among farmers.

The impact of training on income security is also evident in the literature. Akanbi et al., (2021) pointed out that effective training programs lead to increased farm productivity, which directly enhances income. Training provides farmers with the skills to improve yield levels, leading to surplus production, which can be sold for higher returns. Odonkor, (2021) further stresses this by noting that farmers who have undergone training in farm management are better equipped to make informed decisions about resource allocation, thus improving the economic outcomes of their farming activities. As farmers learn to optimize their resources and enhance productivity, they are more likely to increase their income security, ensuring financial stability. Additionally, the improved yield that comes with training often results in better bargaining power in the market, as farmers can sell higher-quality maize at better prices, as highlighted by Li et al., (2024).

Beyond formal training, peer learning and networking serve as powerful components of capacity building, significantly influencing maize production performance. Peer learning allows farmers to exchange practical knowledge and share successful strategies, particularly in managing local challenges such as pests and diseases. Chipfupa et al., (2023) highlighted that

peer learning networks enable farmers to develop innovative solutions based on shared experiences, which in turn enhances productivity. Similarly, Ngango & Hong, (2021) found that networking among farmers helps improve access to markets, which is crucial for ensuring that farmers secure competitive prices for their produce. Peer learning networks create an environment where farmers feel more confident in their abilities, which positively impacts satisfaction. The collaborative learning environment also ensures that farmers can learn from each other's mistakes and successes, helping to reduce risks associated with agricultural practices, thereby increasing overall income security.

The importance of networking in yield levels and income security is further emphasized by Kapari et al., (2023), who noted that farmers who participate in such networks are more likely to access resources like seeds, fertilizers, and credit, which directly improve productivity. Furthermore, peer networks foster relationships with suppliers and buyers, making it easier for farmers to negotiate better deals and access credit facilities, as indicated by Odonkor, (2021). These networks not only facilitate access to essential inputs but also provide farmers with vital market information, helping them to plan their sales and manage their income more effectively. Thus, networking through peer learning not only boosts productivity by improving farming techniques but also enhances farmers' financial resilience and overall income security.

Mentoring is another critical element of capacity building that has a profound influence on maize production performance. Mentoring provides farmers with personalized guidance, helping them to refine their farming practices and adapt to evolving market conditions. According to Odonkor, (2021), mentoring programs help improve farmers' innovative capacity and problem-solving skills, which directly impacts yield levels. Through mentorship, farmers are guided on how to make better decisions regarding resource allocation, pest management, and crop rotations, leading to increased productivity. Mwadzingeni et al., (2025) further support this, emphasizing that mentoring is essential for improving farm management, as it provides a direct channel for farmers to receive advice tailored to their specific needs. In this way, mentoring allows farmers to continually improve their practices, directly contributing to higher yields.

Moreover, mentoring plays a significant role in improving satisfaction and income security. Farmers who receive consistent mentoring often experience a boost in confidence, knowing they have a trusted advisor to guide them through challenges. As Li et al., (2024) explain, mentoring enhances farmers' ability to innovate and manage agricultural risks, which leads to

a more stable and predictable income. This personalized support helps farmers build stronger, more resilient businesses, ultimately enhancing their financial outcomes. Additionally, mentoring can help farmers access new technologies and farming practices that further improve their productivity, contributing to both higher yield levels and increased income. Othieno et al., (2021) also noted that mentoring helps farmers navigate financial challenges by offering advice on accessing credit and insurance, thus ensuring financial security during periods of uncertainty.

The integration of training, peer learning, and mentoring creates a synergistic effect that significantly enhances maize production performance. When farmers are exposed to a combination of formal training, peer learning networks, and personalized mentoring, they are better equipped to tackle the multifaceted challenges of farming. This integrated approach helps farmers improve their yield levels, as each component reinforces the others. Training provides foundational knowledge, peer learning allows for the exchange of practical solutions, and mentoring offers individualized support for tackling complex challenges. As Mwadzingeni et al., (2025) argue, this holistic approach to capacity building ensures that farmers are continuously learning and improving, leading to sustained improvements in productivity over time.

Capacity-building initiatives contribute to production performance by enabling farmers to adapt to the changing agricultural landscape. For example, Odonkor, (2021) highlights that mentoring and training programs that focus on climate-smart agriculture are critical for enhancing farmers' ability to manage the impacts of climate change. By learning how to adapt to changing weather patterns and mitigate the risks of climate-related shocks, farmers can secure their livelihoods and maintain productivity levels even in the face of uncertainty. In addition, peer learning networks provide farmers with the social support needed to navigate these challenges. As Li et al., (2024) suggest, when farmers are part of a network of peers, they are better able to share information on how to cope with external shocks, thus enhancing both their satisfaction and income security.

2.5 Environmental factors, capacity building and maize production performance

The performance of maize production among smallholder is increasingly influenced by how well farmers are capacitated and the environmental context in which they operate. Capacity building equips farmers with the technical and managerial skills necessary to optimize productivity. However, environmental factors notably market conditions and weather changes

often moderate the effectiveness of capacity-building interventions. These factors either enable or constrain the extent to which such capacity translates into tangible agricultural outcomes.

Market conditions which include price volatility, value chain inefficiencies, and infrastructure quality, play a critical moderating role between capacity building and production outcomes. Even with adequate training, poor market access or low prices may demotivate farmers and constrain reinvestment into farming activities. Grote et al., (2021) showed that functioning maize value chains in Africa and Asia enhance food security by ensuring timely access to inputs and stable markets for outputs. These conditions reinforce the positive effects of training on income security. On the contrary, Asfaw et al., (2024) highlighted that despite technical capacity among farmers in Ethiopia, weak linkages to markets and erratic price systems undermined satisfaction and profit margins. Market access also influences the uptake of knowledge from peer networks. Amegnaglo, (2020) notes that farmers are more willing to engage in peer-based innovation when they anticipate economic return. Without access to lucrative markets, knowledge from peer exchanges or mentoring may not lead to behavioral change, limiting improvements in maize yields. Moreover, Gomez-zavaglia et al., (2020) stressed that climate-related disruptions to transportation and storage infrastructure can weaken market functions, reducing the economic benefits even among well-trained farmers. These interactions show that market dynamics are crucial in determining whether capacity-building efforts translate into real performance gains.

Weather changes, including irregular rainfall, droughts, and increased temperatures, significantly affect maize production outcomes and moderate the relationship between farmer capacity and performance. Adeagbo et al., (2021) found that in Nigeria, climate unpredictability reduced the efficacy of training programs, as farmers were unable to apply knowledge under erratic weather conditions. Similarly, Elias et al., (2019) explained that the vulnerability of crops to weather risk reduces the returns on agronomic knowledge, especially when adaptation mechanisms are limited. Akanbi et al., (2021) reported that in South Africa, institutional training programs were limited in their effectiveness due to weak adaptive capacity in the face of climate change. This finding reinforces that weather variability constrains yield stability, even when farmers are technically equipped. Prasanna et al., (2021) echoed similar sentiments, arguing that breeding and training interventions must be aligned with local climatic realities to yield sustainable benefits. For diversification and crop rotation training to build resilience, which moderates the impact of climate volatility (Bowles et al., 2020; Yu et al., 2022). However, such practices require not only training but also favorable climatic windows

to be effective. Weather variability also directly affects farmer satisfaction and income security. Mutengwa et al., (2023) observed that satisfaction levels among Southern African smallholders declined due to frequent crop failures, even where climate-smart agriculture trainings were available. This indicates that environmental stress can negate psychological and economic gains from capacity-building interventions.

The interaction between market and climatic conditions compounds their moderating effect. For instance, a farmer well-trained in CSA practices may still experience losses if extreme weather disrupts yield and market prices collapse due to surplus or low demand. Haider, (2019) highlighted that in Nigeria, weather-induced yield shocks led to oversupply in local markets, driving down prices and reducing income security. Kayad et al., (2021) also emphasized that even with precision agriculture and digital training, yield gains were volatile under adverse weather, undermining satisfaction. In this context, Bali & Singla, (2022) call for integrating weather prediction tools into farmer training to improve decision-making. However, this requires infrastructural support and market connectivity to make such innovations accessible, showing again how intertwined environmental moderators are in shaping maize performance outcomes.

2.6 Research gap

Although existing literature widely explores the impact of agricultural capacity-building initiatives on smallholder farmers emphasizing training, extension services, and technology adoption in enhancing maize production most of these studies are conducted at national or regional levels, with limited empirical evidence specific to Oyam District. Furthermore, despite efforts by the Government of Uganda, such as the Parish Development Model, and interventions by NGOs like World Vision to address low maize productivity in Oyam District, there is still limited data on the actual impact of these capacity-building initiatives. This study, therefore, sought to fill this gap by evaluating the influence of capacity building on maize production performance among smallholder farmers in Oyam District.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter discusses the methods and techniques that were employed to conduct the study. It describes the research design, study area, population, sample size determination, sampling technique, data collection methods, data collection tools, data collection procedure, study variables, quality control, data analysis and presentation, ethical considerations, study limitations, and dissemination of the results. Each of these components was discussed comprehensively in the forthcoming sections.

3.1 Research Design

A descriptive cross-sectional research design was adopted for this study to examine the relationship between human capacity-building interventions and maize productivity among smallholder farmers. This design allows for the simultaneous observation of multiple variables at a single point in time, providing a comprehensive snapshot of the current status of capacity-building efforts and their impact on maize production (Leavy, 2017). Both qualitative and quantitative approaches were employed to achieve a thorough understanding of the research problem. The quantitative approach involved the collection of numerical data through structured questionnaires administered to smallholder farmers, focusing on variables such as training attendance, extension support received, acreage under maize cultivation, and maize yield per acre. This enabled statistical analysis to determine the relationship between human capacity-building interventions and maize productivity. Complementing this, the qualitative approach utilized key informant interviews and focus group discussions with agricultural extension officers, project coordinators, and selected farmers to gather detailed insights into their experiences, perceptions, and challenges related to capacity-building initiatives. This mixed-methods approach ensured both measurable outcomes and contextual depth, thereby providing valuable evidence to inform future interventions and policy decisions.

3.2 Study Area

Oyam District is located in Northern Uganda and was officially established in 2006, following its separation from Apac District. It is named after its chief town, Oyam, which also serves as the location of the district's administrative headquarters.

Geographically, Oyam is bordered by Gulu District to the north, Pader to the northeast, Kole to the east, Apac to the south, Kiryandongo to the southwest, and Nwoya to the west. It lies approximately 78 kilometers west of Lira the largest city in the Lango sub-region and about 290 kilometers from Kampala, Uganda's capital. The district is part of the Lango sub-region, which comprises several districts and is home to an estimated 1.5 million Langi people. Oyam is situated at coordinates 02°14′N, 32°23′E.

The district is predominantly rural, with 94.5% of households engaged in subsistence farming and animal rearing, making agriculture the main economic activity (UBOS, 2019). Major crops cultivated include maize, cotton, cassava, beans, pineapples, and sweet potatoes, while the commonly reared livestock are cattle, goats, chickens, and sheep. The area is mainly inhabited by the Lango people, who speak LebLango, a dialect closely related to the Luo language.

The population of Oyam District has shown steady growth over the years, increasing from approximately 177,100 in 1991 to an estimated 383,644 in recent years. Among the district's notable natural features is the magnificent Karuma Falls, which also serves as a key tourist attraction (Katusiime et al., 2022).

Oyam District was selected as a focal area where the Resilience and Livelihood Project is implemented by World Vision Uganda. This initiative aims to improve agricultural production through targeted capacity-building programs. As part of a study under this project, attention was directed towards smallholder farmers in two sub-counties of Oyam who have participated in these initiatives. The study explored the influence of capacity-building efforts on maize production performance, assessing how such programs enhance farming practices and community resilience. The district's rural nature and dependence on agriculture made it an ideal setting for evaluating the effectiveness of such development interventions.

3.3 Study Population

The study population refers to the group of individuals or units from which the study participants will be drawn (Willie, 2024). In this study, the population included smallholder maize farmers in Oyam District, extension workers, local leaders, and World Vision project officers. The study focused on smallholder farmers who cultivate maize on less than two acres of land, either through ownership or lease agreements, using basic farming tools. This population is relevant because these farmers are the direct beneficiaries of the capacity-building

interventions provided by the World Vision resilience and livelihoods project, which is the focus of the study.

Extension workers and local leaders are key informants, as they possess valuable knowledge about the maize production performance within the district and have been involved in the project's interventions. They provided insights into the broader community impacts, challenges, and the adoption of capacity-building strategies. World Vision project officers, who have been responsible for designing and implementing the interventions, were included to offer an institutional perspective on the effectiveness and sustainability of the project.

Using a sampling frame consisting of registered farmers who have received interventions in the past five years and participated in capacity-building support ensured that the sample is both specific and relevant to the study's objectives. This structured approach enhanced the accuracy and credibility of the findings.

3.4 Sample Size

To establish an appropriate sample size from a population of 210(147 from Minakulu and 63 from Aber Sub counties) s*mall holder farmers*, the researcher employed Yamane's sample size formula. Developed by Japanese statistician Takeo Yamane in 1967, this formula serves as a robust tool for determining the necessary sample size in various research endeavors, including surveys and studies (Chanuan et al., 2021). By applying this formula, the study aimed to ensure a representative and statistically valid sample that accurately reflects the characteristics and attributes of the larger population.

To determine the sample size is by Yamane Formula

$$n = \frac{N}{1 + Ne^2}$$

Where:

N - Total population of respondents (210)

n - Sample size

e - Error size (05% or 0.05)

$$n = \frac{210}{1 + (210) * 0.05^2)} = 138$$

Therefore, the sample size of small holder farmers for this study comprised of 138 respondents and these formed the primary participants. Purposive sampling was then conducted to extension

workers (5), Local leaders (10) and project officers(4) from World Vision Oyam district to establish the total sample size of 157 respondents.

Table 3. 1 Sample size distribution

Category	**Sample Size**	**Sampling Technique**
Smallholder farmers	138	Simple random, Systematic & stratified random sampling
Extension workers in Oyam District (DPO, DCO, 3 AO)	05	Purposive sampling
Local leaders in Oyam District (LC1)	10	Purposive sampling
World Vision Project officers	04	Purposive sampling
Total	**157**	

Source: Primary Data, 2025 (World Vision list of farmers trained)

The total sample was 157 respondents including the smallholder farmers and the key informants as presented in the table above.

3.5 Sampling Techniques

This study employed a combination of stratified random sampling, systematic random sampling and purposive sampling to ensure a representative and comprehensive selection of respondents. Stratified random sampling was used to categorize farmers based on key characteristics such as location (sub-counties or parishes), gender, farm size, and training levels before selecting a random sample from each group. To enhance randomness, systematic random sampling was applied since a list of registered farmers was available, selecting every nth farmer from the list. Purposive sampling was used to identify key informants such as World Vision project officers, agricultural extension workers, and local leaders, who provided expert insights into capacity-building initiatives. These techniques collectively ensured that the sample is both representative and diverse, capturing a holistic view of the impact of human capacity-building on maize productivity.

3.6 Data Collection Methods

This study employed surveys and interviews as the primary data collection methods to gather comprehensive information on the role of capacity-building initiatives in improving maize production performance among smallholder farmers in the Resilience and Livelihood Project in Oyam District. These methods facilitated the collection of both quantitative and qualitative

data, ensuring a holistic understanding of the effectiveness of NGO-led interventions in enhancing farmers' productivity (Asenahabi, 2019).

3.6.1 Questionnaire Surveys

Survey questionnaires were used to collect quantitative data from selected smallholder farmers who are beneficiaries of the Resilience and Livelihood Project in Oyam District. The questionnaires were structured to gather information on farmers' participation in capacity-building programs, types of training received, access to agricultural extension services, and changes in maize production levels. The questionnaires were administered using a combination of self-administration and face-to-face assistance. Farmers who were literate and confident completed the questionnaires on their own, while trained research assistants (enumerators) supported those who required help, particularly in interpreting or completing the forms. This approach ensured that all selected participants, regardless of literacy level, were able to take part in the survey effectively. To improve accessibility and accuracy of responses, the questionnaire was translated into the local dialect. This allowed respondents to comfortably express their experiences and perceptions. Enumerators also helped clarify questions when needed and ensured that all responses were complete.

Using closed-ended questions provided consistency across responses, made data easier to analyze statistically, and supported comparisons across different farmer groups (Kothari, 2004). The use of trained research assistants also enhanced data quality by reducing misunderstandings and increasing response accuracy. As Bryman, (2016) notes, structured questionnaires with enumerator support help improve both the reliability and validity of data, especially in large-scale field studies.

3.6.2 Interviews

Key informant interviews were conducted with NGO project officers, agricultural extension workers, and local leaders to gather qualitative insights into the effectiveness of capacity-building initiatives in enhancing maize production among smallholder farmers. These interviews provided in-depth perspectives on the design, implementation, and impact of training programs, as well as the challenges faced in delivering agricultural extension services (Castillo-Montoya, 2016).

Unstructured interview approach was adopted to allow for flexibility in discussions on the research objectives while ensuring that critical study themes are covered. Open-ended questions were used to encourage detailed responses and deeper exploration of topics such as

the effectiveness of training programs, farmers' adoption of modern farming techniques, and constraints limiting the success of capacity-building initiatives. To facilitate meaningful engagement, interviews were conducted in the local dialect, ensuring that respondents can communicate freely and provide candid insights (Elhami, 2022).

3.6.3 Focus Group Discussion

As part of the data collection process for this study, five Focus Group Discussions (FGDs) were conducted within Aber and Minakulu Area Programmes in Oyam District. Participants were purposefully selected to ensure representation across key stakeholder categories, including men, women, youth and persons with disabilities. The FGDs provided valuable qualitative insights into the perceptions and experiences of smallholder farmers regarding the influence of capacity-building initiatives on maize production performance. These discussions complemented other data sources and enriched the understanding of how different groups within the community engaged with and benefited from the interventions implemented under the Resilience and Livelihood Project.

A total of five focus group discussions (FGDs) were conducted, involving 63 participants (36 women and 27 men). The groups were distributed as follows: FGD1 included 15 participants (8 women and 6 men), FGD2 had 12 (6 women and 6 men), FGD3 had 10 (7 women and 3 men), FGD4 had 16 (9 women and 7 men), and FGD5 had 11 (6 women and 5 men). The discussions were held in Oyam District at meeting venues located in the villages of Minakulu and Aber Sub-counties.

3.7 Data Collection Tools

To facilitate effective data collection, three primary tools were utilized: a structured questionnaire, an interview guide, and a focus group discussion guide. These tools were pre-tested and refined to enhance their validity, reliability, and contextual relevance before being deployed in the field (Mugenda & Mugenda, 2003).

3.7.1 Structured Questionnaire

A questionnaire is a structured research instrument used to systematically collect data from respondents on specific variables of interest (Lietz, 2010). In this study, a structured questionnaire was used to gather quantitative data from smallholder maize farmers in Oyam District. The tool captured demographic information such as age, gender, education level, and farming experience, as well as data on farming practices, land size, input use, and maize yields before and after participating in capacity-building programs. It also assessed farmers' access to

capacity-building interventions, frequency of training, and knowledge gained. Additionally, the questionnaire explored the perceived impact of NGO initiatives on maize productivity, resilience to climate shocks, and adoption of improved agronomic practices.

Questions in the questionnaire were presented in a logical sequence, ensuring ease of completion and minimizing respondent fatigue. Likert-scale questions were incorporated where necessary to measure farmers' perceptions of the effectiveness of training programs and agricultural support services. The structured format allowed for consistency in data collection, making it easier to analyze and compare responses across different respondents.

3.7.2 Interview Guide

The interview guide provided a structured framework for conducting semi-structured interviews with key informants, ensuring consistency while allowing for flexibility in responses. The guide covered critical themes such as the role of NGOs in farmers' capacity-building and agricultural extension, challenges in implementing training programs for smallholder farmers, sustainability and long-term impact of capacity-building interventions, and recommendations for improving the effectiveness of agricultural extension and training programs.

Open-ended questions were used to facilitate detailed discussions, enabling respondents to share their experiences, insights, and suggestions freely. The interview guide ensured that all key study areas are adequately covered while allowing interviewers the flexibility to explore emerging issues that arise during the discussions. The use of an interview guide enhances data reliability and ensures that critical aspects of the research questions are systematically addressed (Castillo-Montoya, 2016).

3.7.3 Focus Group Discussion Guide

To supplement data collected through surveys and interviews, focus group discussions were conducted with groups of smallholder farmers participating in the Resilience and Livelihood Project. Focus group discussions were used to explore farmers' collective experiences with capacity-building programs, their perceptions of training effectiveness, and challenges faced in implementing learned farming techniques. Focus group discussions allowed for the triangulation of data and provide a platform for farmers to discuss shared experiences, thus enhancing the depth of qualitative insights (Taylor & Blake, 2015).

The focus group discussion guide included discussion prompts on topics such as knowledge gained from training programs and its application in maize production, barriers to adopting

improved farming practices, support needed to enhance the sustainability of NGO-led interventions, and farmers' recommendations for strengthening capacity-building initiatives. Each focus group discussion session comprised of between six and ten participants to allow for active engagement while maintaining manageable group dynamics. Discussions were conducted in the local dialect, ensuring inclusivity and enabling farmers to express their opinions freely.

Through employing these data collection tools, the study ensured a comprehensive and triangulated approach to understanding the relationship between NGO-led farmers' capacity-building initiatives and maize production performance in Oyam District. The integration of both quantitative and qualitative data collection methods enhanced the validity of findings and provide a more nuanced understanding of the subject matter.

3.8 Validity and reliability of the instruments

3.8.1 Validity

Content validity, criterion validity, and construct validity were ensured through expert consultation. Content experts reviewed the draft versions of the instruments to verify their appropriateness, completeness, and relevance. Thereafter, the instruments were pilot tested with a small sample of respondents to assess their feasibility, clarity, and functionality (Pandey & Patnaik, 2014).

3.8.2 Reliability

Reliability of the constructs were determined through test-retest and internal consistency checks. Test-retest reliability was assessed by administering the questionnaire twice to a subset of the pilot sample at an interval of two weeks. Internal consistency was gauged using Cronbach's alpha coefficient, with a threshold value set at 0.7 (Pandey & Patnaik, 2014).

Table 3.2 showing the reliability analysis

Constructs	Cronbach's Alpha	N of Items
Training	0.925	6
Peer learning and networking	0.812	6
Mentoring	0.906	6
Yield level	0.830	6
Satisfaction	0.825	6
Income security	0.883	6
Market conditions	0.516	6
Weather conditions	0.696	6

Source: Primary Data, 2025

The reliability analysis shows that most constructs demonstrate strong internal consistency, meaning the items used to measure them are reliable. Training, with a Cronbach's Alpha of 0.925, and mentoring, with 0.906, show excellent reliability. Peer learning and networking (0.812), yield level (0.830), satisfaction (0.825), and income security (0.883) all display good reliability, indicating that the items within these constructs are well aligned and consistently measure their intended concepts. In contrast, the market conditions construct, with an alpha of 0.516, shows low reliability, suggesting that the items did not work well together. Similarly, the weather conditions construct, with an alpha of 0.696, shows moderate reliability, indicating that the items worked together to some extent but could still be improved for greater consistency.

3.9 Data Analysis

The study employed both quantitative and qualitative data analysis techniques to ensure a comprehensive understanding of the research problem. Quantitative data collected through structured questionnaires was analyzed using the Statistical Package for Social Sciences (SPSS). This involved the use of descriptive statistics such as frequencies and percentages to summarize the data. Additionally, inferential statistics such as regression analysis was applied to examine relationships and test the influence between variables. The moderation effect was analyzed using the Process Macro version 43 to investigate the moderating effect of environmental factors on the influence of farmers' capacity building on the maize production performance. These statistical procedures helped identify patterns, trends, and associations among the key constructs measured in the study.

On the other hand, qualitative data obtained from key informant interviews and focus group discussions were analyzed using thematic analysis. This approach involved systematically coding the interview transcripts, identifying recurring themes, and interpreting their significance in relation to the research questions. Thematic analysis provided deeper insight into farmers' lived experiences, perceptions, and contextual factors that may not be captured through quantitative methods, therefore the qualitative findings were used to compliment on the quantitative findings. The integration of both analytical approaches enriched the study's findings, enhance validity, and offer a more holistic view of the factors influencing maize production among smallholder farmers.

3.10 Ethical Consideration

This study adhered to established ethical standards to ensure the protection, dignity, and rights of all participants. Participants were fully informed about the purpose of the research, the voluntary nature of their involvement, their right to refuse or withdraw at any time without penalty, and the potential risks and benefits of participation. Written consent was obtained from all participants before data collection began. To maintain confidentiality, personal identifiers such as names were excluded, and all data was treated anonymously.

Ethical approval for the study was obtained from the relevant institutional review board to ensure compliance with professional research standards. Transparency was maintained throughout the process, particularly given the researcher's employment with World Vision. Participants were informed of this affiliation in advance, and clear boundaries were established to separate the researcher's professional role from the research activities. The study was conducted independently, with data collection carried out by research assistants and findings presented objectively, free from any organizational influence or bias.

3.11 Limitations and Delimitations

This study encountered several practical and methodological challenges, as well as clearly defined boundaries set to narrow its scope. One of the main challenges was accessing some of the targeted farmers due to the remoteness of certain areas within Oyam District. Poor road infrastructure and adverse weather conditions made travel difficult, occasionally delaying data collection. To address this, the researcher adjusted the data collection schedule to align with favorable weather periods and engaged local guides familiar with the terrain to reach hard-to-access communities. Another limitation involved balancing academic research with ongoing work responsibilities, which created time constraints and reduced flexibility for field visits. This was mitigated through careful planning of data collection activities, conducting fieldwork during weekends and leave days, and enlisting support from trained research assistants to maintain the schedule even when personal availability was limited.

Methodologically, the study relied on a convenience sample rather than a fully randomized one, which may limit the generalizability of its findings. Nonetheless, efforts were made to include a diverse range of farmers with different experiences and backgrounds to enhance representativeness. Response bias also posed a risk, as some farmers might have overstated or understated their participation in capacity-building programs or productivity levels. This was minimized by assuring respondents of confidentiality and cross-checking responses with

official records and third-party sources. Language barriers further complicated communication, as some respondents spoke different dialects; translation support was therefore provided to ensure accuracy and avoid misinterpretation. Additionally, seasonal fluctuations in agricultural productivity were considered, and data collection was timed to coincide with the peak growing season to ensure the findings reflected consistent and relevant results.

CHAPTER FOUR

PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULTS

4.0 Introduction

This chapter presents the findings of the study based on data collected from smallholder farmers in Oyam District. The analysis is organized around the specific objectives of the study, which were to assess farmers' capacity-building initiatives, evaluate maize production performance, examine the influence of capacity-building on production outcomes, and explore the moderating effect of environmental factors on this relationship. The results are presented in relation to each objective to provide a clear understanding of the trends, patterns and relationships emerging from the data.

4.1 Demographic information

This section outlines the demographic characteristics of the smallholder farmers who participated in the study. Understanding these characteristics provides important context for interpreting the findings, as demographic factors can influence how farmers engage with capacity-building interventions and adopt new agricultural practices.

Table 1 showing the demographic information

Characteristics	Category	Frequency	Percent
Age	18-25	1	0.8
	26-35	35	26.9
	36-45	39	30
	46-55	35	26.9
	Above 55	20	15.4
Sex	Male	92	70.8
	Female	38	29.2
Marital status	Single	3	2.3
	Married	110	84.6
	Separated	8	6.2
	Widowed	9	6.9
Number of children	None	2	1.5
	1-2	32	24.6
	3-4	52	40
	5+	44	33.8
Education level	Primary school	59	45.4
	Secondary school	51	39.2
	Vocational/technical school	10	7.7
	College/university	10	7.7

Occupation	Part-time farmer	10	7.7
	Full-time farmer	120	92.3
Years of farming experience	Less than 5 years	8	6.2
	5-10 years	46	35.4
	11-20 years	38	29.2
	21-30 years	29	22.3
	Above 30 years	9	6.9
Average annual income	Less than UGX 1000000	15	11.5
	UGX 1000000-UGX 2000000	66	50.8
	UGX 2000000-UGX 5000000	43	33.1
	UGX 5000000-UGX 10000000	5	3.8
	Above UGX 10000000	1	0.8
Farm size (in acres)	Less than 1	1	0.8
	1-2	22	16.9
	2-5	86	66.2
	5-10	18	13.8
	Above 10	3	2.3

Source: Primary Data, 2025

The largest portion of participants falls within the 36 to 45 age group, which accounts for 30% of the total sample. This is a significant share, suggesting that many participants are in their mid-career or family-raising years. Close behind are the 26 to 35 and 46 to 55 age groups, each representing 26.9% of the sample. These three age brackets combined make up over 83% of the entire group, showing that most participants are between 26 and 55 years old. Only 15.4% are older than 55, and just 0.8% fall into the youngest group, aged 18 to 25. This pattern indicates that the participant pool is largely made up of mature adults who are likely well-established in their roles, particularly in farming or household leadership. The very low representation of young adults suggests limited youth involvement, which may point to challenges in attracting younger generations to agriculture.

The gender distribution in the sample shows a strong male majority. Specifically, 70.8% of participants are male, while only 29.2% are female. This means there are more than twice as many men as women in the study. Such a gap may reflect traditional gender roles in agricultural communities, where men often serve as the primary decision-makers or landowners, and women may either be underrepresented or excluded from formal participation in farming surveys or decision-making processes. It could also suggest that support programs and training initiatives in the area may need to make a stronger effort to reach and engage women.

A large majority of participants 84.6% are married. This is a noteworthy finding because it signals a population that is mostly made up of family units. The remaining respondents include

6.9% who are widowed, 6.2% who are separated, and only 2.3% who are single. The high percentage of married individuals may be tied to the demands of farming, which often relies on family labor. Farming households typically share responsibilities, so having a spouse can be an important support system for managing agricultural and household duties. The low number of single participants could also suggest that individuals are more likely to settle down before or as they engage in farming full-time.

The data shows that large families are common among participants. About 40% have 3 to 4 children, making this the most frequent family size. Another 33.8% report having 5 or more children, while 24.6% have 1 to 2 children. Only 1.5% of respondents do not have any children. These numbers highlight the prevalence of larger family sizes, which may be influenced by cultural norms, economic factors, or the labor needs of family-based farming. Children often contribute to farm activities from a young age in rural areas, so having more children can be seen as a practical asset in agricultural households.

In terms of education, most participants have only completed primary school (45.4%) or secondary school (39.2%). A much smaller portion 7.7% have attended vocational or technical schools, and another 7.7% have received college or university education. This means that 84.6% of participants have not pursued any form of post-secondary education. These figures suggest limited access to advanced education in the area, which could affect exposure to modern farming techniques, financial literacy, or access to information. It also raises concerns about the long-term potential for innovation or economic diversification among farming households.

The vast majority of participants (92.3%) identify as full-time farmers, with only 7.7% working part-time in agriculture. This indicates that farming is not a side activity or supplemental income source for most participants it is their main livelihood. Such a high rate of full-time involvement also means that any challenges in agriculture, such as crop failure or market instability, are likely to have a direct and serious impact on their economic well-being. It also suggests a strong dependence on land and weather conditions.

In terms of experience, the participants appear to be seasoned farmers. About 35.4% have been farming for 5 to 10 years, making this the largest experience group. Another 29.2% have 11 to 20 years of experience, while 22.3% have been farming for 21 to 30 years. Smaller numbers are found at either end of the spectrum: 6.2% have less than 5 years of experience, and 6.9% have over 30 years. This shows that the majority around 87% have between 5 and 30 years of

farming experience, which speaks to a high level of practical knowledge and long-term commitment. However, the small percentage of new farmers may point to a lack of new entrants into the profession.

The income distribution shows that most participants earn relatively modest amounts. The largest group (50.8%) earns between UGX 1,000,000 and UGX 2,000,000 annually. Another 33.1% earn between UGX 2,000,000 and UGX 5,000,000. Only 11.5% earn less than UGX 1,000,000, while 3.8% fall between UGX 5,000,000 and UGX 10,000,000. Just 0.8% of the sample earn more than UGX 10,000,000 per year. These figures indicate that farming in this region is not highly profitable for most households, with over 95% of participants earning below UGX 5,000,000 annually. This reinforces the idea that participants are operating small-scale farms and likely face financial constraints.

Looking at land size, most participants operate small to medium-sized farms. Specifically, 66.2% own land between 2 and 5 acres. Another 16.9% have between 1 and 2 acres, while 13.8% own 5 to 10 acres. Very few participants are at either extreme: 0.8% have less than 1 acre, and 2.3% have more than 10 acres. This shows that the majority are smallholder farmers, managing plots that are typically labor-intensive and yield modest returns. The small land sizes are likely a contributing factor to the low-income levels observed and could also limit the adoption of larger-scale or mechanized farming methods.

4.2 Capacity building initiatives in Oyam District

This section presents findings on the capacity-building interventions delivered through the Resilience and Livelihood Project. The analysis is organized into three main areas: training, peer learning and networking, and mentoring. The results highlight both the reach and effectiveness of each component and offer insight into how farmers perceived their value and applicability in real-world farming contexts.

4.2.1 Training

Training was a central component of the capacity-building efforts under the Resilience and Livelihood Project. This section examines the types of training received by smallholder farmers, the frequency and duration of these sessions, and the topics covered. Areas of focus included climate-smart agriculture, modern maize farming techniques, post-harvest handling, and financial literacy. The analysis also explores farmers' perceptions of the relevance and effectiveness of the training, as well as how the knowledge gained has been applied in their day-to-day farming activities.

Table 2: Training

No.	Statement	SD	D	SD+D	NS	A	SA	A+SA
		%	%	%	%	%	%	%
1	I have received adequate training on Modern maize farming techniques	0	5.4	5.4	0.8	50	43.8	93.8
2	I have been trained on Post-harvest handling	0	0.8	0.8	0.8	49.2	47.7	96.9
3	I have been trained on good agronomic practices	0	2.3	2.3	3.8	46.9	46.9	93.8
4	I have been trained on Integrated Pest Management	0.8	3.8	4.6	3.8	48.5	43.1	91.6
5	I have been trained on Climate smart agriculture	0	3.1	3.1	0	47.7	49.2	96.9
6	Training has helped me adopt new technologies in maize production	0	1.5	1.5	0	50.8	47.7	98.5
	Average	0.13	2.82	2.95	1.53	48.85	46.40	95.25

SD – Strongly Disagree, D – Disagree, N – Not sure, A – Agree, SA – Strongly Agree

Source: Primary Data, 2025

The results in table 5 reveal the following; a large majority of respondents, 93.8%, accepted that they have received adequate training in modern maize farming techniques. Only 5.4% disagreed, and less than 1% were neutral. This suggests that most farmers feel confident about the training they have received in this area. Nearly all respondents, 96.9%, accepted that they had been trained in post-harvest handling and the disagreement was almost nonexistent at just 0.8%. About 93.8% of respondents accepted that they had been trained in good agronomic practices with only 2.3% disagreeing. In this case, 91.6% accepted that they had received training on integrated pest management, while 4.6% disagreed. A strong 96.9% accepted that they had been trained on climate-smart agriculture, while only 3.1% disagreed. This high level of agreement shows that most farmers are being introduced to techniques that help them manage climate-related risks and promote sustainable farming. 98.5% accepted that training has helped them adopt new technologies in maize production and only 1.5% disagreed.

On average, 2.95 percent of respondents disagreed with the statements on training, while 95.25 percent agreed. This shows that nearly all respondents recognize the positive impact of training on their maize farming, including acquiring modern techniques, improving post-harvest handling, and adopting new technologies.

The training initiatives implemented under the program were widely appreciated by participants and were perceived as practical, timely, and highly relevant to their farming needs.

Respondents frequently highlighted that the training provided a holistic package covering climate-smart agriculture, good agronomic practices, post-harvest handling, financial literacy, business thinking, and value chain development. Many participants noted that the trainings helped them adapt to changing climate conditions by adopting practices such as mulching, using drought-resistant varieties, and engaging in micro-scale irrigation. According to one LC, *"we were sensitized on good agronomic practices and climate-smart agriculture… planting with the first rain and mulching during dry spells has helped improve our maize."* These sentiments were echoed during focus group discussions, where farmers emphasized the inclusion of climate-smart agriculture and disaster risk reduction as critical aspects of the program.

Several respondents stated that agronomic training empowered them with improved knowledge of site selection, appropriate spacing, and application of fertilizer and pesticides. Some participants recalled specific techniques such as *"removing maize flowers after one week of flowering to avoid cross-pollination,"* demonstrating retention of practical content. In addition to cultivation techniques, farmers noted that timely planting and pest and disease control were emphasized, with one respondent remarking that *"training has introduced new agronomic practices, encouraged the use of quality seeds, and increased yields."* Participants associated these lessons with tangible improvements in production.

Post-harvest handling was another highly valued area, especially due to the challenges of aflatoxin and storage losses. Participants shared that they were trained in *"drying maize using tarpaulins provided at a fair price,"* proper shelling, and safe storage methods. One farmer stated that these interventions helped *"increase storage quality and protect maize from rotting and contamination."* Training in this area was often scheduled seasonally, timed to coincide with harvest periods.

The shift towards treating farming as a business was also appreciated. Respondents indicated that they learned record-keeping, market analysis, and profit-based decision making. Discussions revealed that trainings introduced farmers to market linkages and bulk selling strategies, giving them improved access to buyers. One respondent during the focus group mentioned, *"We now have linkages with agro-input dealers and cooperatives like ABEKAM ACE, and we sell our maize at a better price."* Participants further reported increased confidence in farming as a viable enterprise.

Financial literacy was recognized as essential yet insufficiently accessed, with several respondents recommending wider coverage. Farmers reported receiving training on budgeting, savings, and credit access, with one describing financial literacy as *"very essential and should be extended to more groups in the ward."* Those who attended testified that it improved their ability to plan and leverage savings groups for investment in farming.

Training on value addition and market integration was also mentioned as contributing to income enhancement. Some LCs shared that they were introduced to modern technologies including shelling and irrigation machines and exposed to market opportunities during agricultural exhibitions and exchange visits. Others reported that linkages created with traders and processors helped them understand pricing dynamics and improve negotiation power.

The training was characterized by varied delivery methods including farm visits, demonstration plots, farmer field schools, radio sensitizations, workshops, and practical sessions. Extension workers highlighted the importance of hands-on learning and engagement, noting that active participation helped farmers adopt new practices more effectively. One extension worker explained that methods such as *"exchange learning visits, brainstorming sessions, and experience sharing activities"* fostered peer learning and practical exposure.

Participants indicated that training frequency differed depending on the topic and agricultural calendar. Some received sessions weekly, particularly through farmer field schools and group meetings, while others described receiving training on a quarterly or seasonal basis. A member of the focus group shared that *"training used to be every two weeks conducted by TOTs and agricultural officers,"* whereas another mentioned that sessions were aligned with savings group meetings. While the scheduling was generally well-aligned with farming cycles, some respondents recommended more regular refresher trainings to reinforce learning and prevent knowledge loss.

Training quality and relevance were consistently rated as very high, with respondents acknowledging that the interventions *"came at the right time"* and contributed significantly to improved productivity. Participants appreciated the practical orientation and effectiveness of training in solving community challenges. As one farmer expressed during the focus group, *"the quality was excellent… it improved our knowledge and skills, increased yields, and linked us to better markets."* However, some felt that the training did not reach all targeted beneficiaries, particularly those outside organized farmer groups. A respondent noted that the

"capacity-building programs are not yet sustainable because many farmers were not included," emphasizing the need for wider community coverage.

4.2.2 Peer learning & networking

The results in this section provide insight into how farmers engage with one another through peer learning and networking. By looking at how many respondents agreed or disagreed with each statement, the role that these interactions play in improving farming practices, solving challenges, and sharing information can be understood.

Table 3: Peer learning & networking

No.	Statements on Peer Learning & Networking	SD	D	SD+D	NS	A	SA	A+SA
		%	%	%	%	%	%	%
1	I regularly interact with other farmers to share maize farming experiences.	0	6.2	6.2	0.8	63.8	29.2	93
2	I have learned better maize farming practices through farmer groups.	0	1.5	1.5	3.8	63.8	30.8	94.6
3	Networking with other farmers has improved my knowledge and productivity.	0.8	3.8	4.6	0.8	64.6	30	94.6
4	I actively participate in farmer field days and local exhibitions.	2.3	16.9	19.2	8.5	57.7	14.6	72.3
5	Peer learning has helped me solve practical farming challenges.	0	6.9	6.9	3.1	54.6	35.4	90
6	I consider my network of fellow farmers a key source of information.	0	2.3	2.3	3.1	78.5	16.2	94.7
	Average	0.52	6.27	6.78	3.35	63.83	26.03	89.87

SD – Strongly Disagree, D – Disagree, NS – Not sure, A – Agree, SA – Strongly Agree

Source: Primary Data, 2025

The results in table 8 above indicate that a large majority of respondents (93%) reported that they regularly interact with other farmers to share maize farming experiences, while only 6.2% disagreed. When asked whether they had learned better maize farming practices through farmer groups, 94.6% agreed and only 1.5% disagreed. The statement about networking with other farmers improving knowledge and productivity also received strong support, with 94.6% agreeing and just 4.6% disagreeing. Participation in farmer field days and local exhibitions showed lower agreement, with 72.3% in support and 19.2% disagreeing. 19% of respondents agreed that peer learning has helped them solve practical farming challenges, while 6.9% disagreed. The highest level of agreement was recorded for the statement about networks being a key source of information, with 94.7% of respondents agreeing and only 2.3% disagreeing.

On average, 6.78 percent of respondents disagreed with the statements on peer learning and networking, while 89.87 percent agreed. This indicates that most respondents see strong value in engaging with other farmers, crediting these interactions with improving their farming practices, solving challenges, and accessing useful information.

Peer learning emerged as a key mechanism through which farmers exchanged knowledge, strengthened practical skills, and promoted the adoption of improved technologies. The use of farmer field schools, demonstration plots, exchange visits, group structures, and networking platforms provided multiple avenues for hands-on interaction and shared learning. Farmers emphasized that practical and experiential approaches allowed them to better understand new technologies and farming practices through observation, experimentation, and collaborative problem-solving.

Farmer field schools functioned as active learning spaces where farmers engaged in practical demonstrations and group discussions to reinforce new skills. Participants noted that observing the outcomes of techniques firsthand made it easier to trust and apply them on their own farms. Demonstration plots served a similar purpose, with farmers able to directly see the benefits of improved agronomic practices and climate-smart technologies. The visibility of results, according to respondents, encouraged more farmers to adopt new methods confidently.

Exchange visits were highlighted as particularly valuable in widening exposure beyond the immediate community. Farmers participated in trips to agricultural exhibitions, such as Jinja and Ngeta, where they were able to interact with other farmers, ask questions, and observe best practices being implemented elsewhere. Some respondents indicated that such learning tours introduced them to modern technology like hand shelling machines and irrigation equipment, and provided real-life evidence of successful farming strategies.

Farmer groups and cooperatives were consistently recognized for enhancing collective learning, bulking produce, and facilitating joint marketing efforts. Participants expressed that working in groups improved their bargaining power, strengthened peer support, and allowed them to learn from fellow farmers' experiences. Networking through cooperatives and partnerships with NGOs further helped farmers establish market linkages and connect with agro-input dealers and financial service providers. Engaging in cooperative structures also enabled farmers to share risks, access inputs more affordably, and coordinate activities more efficiently.

However, several challenges affecting peer learning were noted. One extension worker mentioned that learning pace differed among members, with *"some group members being slow learners, and most men delegating their women to attend training and adopt new skills."* This suggests gender-related roles and possible barriers to direct participation by male farmers. Another extension worker pointed out limitations in participation due to competing farming responsibilities, explaining that *"there is limited participation, especially during peak farming activities."* Additionally, issues of dependency emerged, where some farmers expected input distributions or transport refunds after training, which hindered motivation toward self-driven learning.

Challenges also existed in the effectiveness of learning platforms. According to one extension worker, *"meetings sometimes have low turnout and late reporting, radio talk shows are given very limited time, and establishing good demonstration sites is expensive with the small funds received for extension work."* These resource constraints limited the impact and scalability of peer learning initiatives and restricted broader community access.

4.2.3 Mentoring

The following section presents an interpretation of the responses related to mentoring in maize farming. By examining the percentages of respondents who agreed or disagreed with each statement, how mentoring relationships influence farmers' access to guidance, confidence, and decision-making can be assessed. Each paragraph below discusses the level of support or concern reflected in the data and what it may suggest about the role of mentoring in this context.

Table 4: Mentoring

No.	Statements on Mentoring	SD	D	SD+D	NS	A	SA	A+SA
		%	%	%	%	%	%	%
1	I have access to experienced farmers who mentor me in maize farming.	0.8	6.9	7.7	1.5	71.5	19.2	90.7
2	Mentoring has helped me improve my maize production methods.	0	7.7	7.7	1.5	74.6	16.2	90.8
3	I can rely on a mentor for advice during difficult farming situations.	0	13.1	13.1	5.4	72.3	9.2	81.5
4	Mentors help me stay updated with current agricultural trends.	0	10	10	3.1	67.7	19.2	86.9

5	I frequently consult my mentor before making farming decisions.	0.8	13.1	13.9	3.8	61.5	20.8	82.3
6	Mentoring has enhanced my confidence in maize farming.	0	7.7	7.7	1.5	61.5	29.2	90.7
	Average	0.27	9.75	10.02	2.80	68.18	18.97	87.15

SD – Strongly Disagree, D – Disagree, NS – Not sure, A – Agree, SA – Strongly Agree

Source: Primary Data, 2025

The results in table 9 reveal that; a strong majority of respondents (90.7%) agreed that they have access to experienced farmers who mentor them in maize farming, while only 7.7% disagreed. When asked whether mentoring has helped them improve their maize production methods, 90.8% agreed and 7.7% disagreed. A slightly lower level of agreement was seen in response to whether farmers can rely on a mentor during difficult situations. While 81.5% agreed, 13.1% disagreed and 5.4% were neutral. Regarding whether mentors help farmers stay updated with current agricultural trends, 86.9% agreed and 10% disagreed. When it comes to consulting mentors before making farming decisions, 82.3% of respondents agreed and 13.9% disagreed. Finally, 90.7% of respondents agreed that mentoring has enhanced their confidence in maize farming, with only 7.7% in disagreement.

On average, 10.02 percent of respondents disagreed with the statements on mentoring, while 87.15 percent agreed. This shows that most respondents value mentoring as an important support system in maize farming, with many crediting it for improving their skills, confidence, and access to agricultural knowledge.

Mentoring played a critical role in bridging the gap between training and practical implementation, enabling farmers to translate new knowledge into improved agricultural practices. Through technical mentorship, follow-up, and support in establishing demonstration sites, extension workers, trainers of trainees (TOTs), and market facilitators offered personalized guidance that complemented group-level training sessions. Farmers emphasized that this one-on-one support reinforced their understanding of good agronomic practices, post-harvest handling, and climate-smart agriculture, and enabled them to troubleshoot challenges directly in the field.

According to focus group discussions, farmers experienced a transformation in their farming practices following the mentoring support. One respondent noted, *"As a group, we feel fully empowered and more capable than in past years before the World Vision training. Previously, our production yields were low and we often mismanaged our money. World Vision trained us*

in financial literacy, linked us to Vision Fund, and we were able to access FAST loans to support with our maize production." This highlights that mentorship went beyond agronomy to include business and financial support, which helped farmers effectively apply learned skills with access to complementary services such as credit.

Mentors frequently conducted periodic visits and performance tracking, ensuring that farmers correctly implemented the techniques introduced during training sessions. Such follow-up assessments helped address gaps and provided continuous encouragement. Some respondents highlighted that the guidance they received led to improved crop management and increased yields. For instance, a member of the focus group stated, *"We are now able to plant good quality seeds, practice proper agronomic techniques, handle post-harvest practices effectively, and adopt new technologies in maize production after attending several trainings organized by World Vision and the Sub-counties."* This reflects not only skill acquisition but also successful adoption of technologies as a result of continued field-level mentorship.

In addition to follow-ups, mentors actively supported the establishment and maintenance of demonstration gardens. These sites served as reference points where farmers could revisit techniques, observe progress, and discuss practical challenges with mentors. The ongoing engagement through demonstration plots promoted continuous learning and provided a platform for problem-solving as new farming challenges emerged.

However, despite the positive results, some farmers reported inconsistencies in mentorship and expressed the need for more regular contact with extension staff. They felt that follow-up visits were sometimes irregular, potentially affecting the momentum in applying recommended practices. This inconsistency limited some farmers' ability to sustain implementation, particularly those requiring more guidance to adapt to new technologies.

4.3 Maize production performance in Oyam District

This section presents findings on the performance of maize production among smallholder farmers. The analysis focuses on three key aspects: yield levels, farmer satisfaction, and income security. It examines changes in maize output before and after the capacity-building interventions, how satisfied farmers are with their production outcomes, and whether improved yields have translated into greater income stability and food security at the household level.

4.3.1 Yield level

This section focuses on farmers' perceptions of their maize yield levels. By analyzing the agreement and disagreement percentages, a sense of how farmers view their yield trends, satisfaction, and the impact of improved practices was got. The following paragraphs interpret each statement to highlight where farmers feel successful and where there may be room for improvement or concern.

Table 5: Yield Level

No.	Statements on Yield Level	SD	D	SD+D	NS	A	SA	A+SA
		%	%	%	%	%	%	%
1	My maize yield per acre has increased over the past seasons.	0	11.5	11.5	3.8	52.3	32.3	84.6
2	I consider my maize yields satisfactory compared to my effort.	0.8	17.7	18.5	5.4	60	16.2	76.2
3	I achieve higher yields when I follow improved farming practices.	0	2.3	2.3	0	53.1	44.6	97.7
4	My farm produces more maize now than it did two years ago.	0.8	8.5	9.3	2.3	53.1	35.4	88.5
5	I consistently reach my maize yield targets each season.	3.8	20.8	24.6	6.2	56.9	12.3	69.2
6	My maize yield level is above the average in my community.	5.4	19.2	24.6	26.9	36.9	11.5	48.4
	Average	1.80	13.33	15.13	7.43	52.05	25.38	77.43

SD – Strongly Disagree, D – Disagree, NS – Not sure, A – Agree, SA – Strongly Agree

Source: Primary Data, 2025

The results in table 10 reveal that; a total of 84.6% of respondents agreed that their maize yield per acre has increased over past seasons, while 11.5% disagreed. This indicates that the majority have seen positive changes in their production over time. When asked whether their yields are satisfactory compared to the effort they put in, 76.2% agreed, and 18.5% disagreed. While the majority are generally satisfied, this statement had a slightly higher level of disagreement. Nearly all respondents (97.7%) agreed that following improved farming practices leads to higher yields, with only 2.3% in disagreement. This is the most strongly supported statement in the section. A high percentage of respondents (88.5%) agreed that their farms produce more maize now than they did two years ago, with only 9.3% disagreeing. In contrast, only 69.2% agreed that they consistently reach their maize yield targets each season, while 24.6% disagreed and this shows a notable drop in confidence when it comes to hitting specific goals. The lowest level of agreement was seen in the final statement, where only 48.4%

said their maize yield is above the community average, while 24.6% disagreed and 26.9% were neutral. This mixed response suggests a range of performance levels among farmers, with many not seeing themselves as outperforming others.

On average, 15.13 percent of respondents disagreed with the statements on yield level, while 77.43 percent agreed. This suggests that most respondents view their maize yields positively, with many acknowledging improvements and benefits from better farming practices, though a smaller proportion report less favorable outcome.

Farmers consistently reported notable improvements in maize yields following their participation in training and capacity-building programs, attributing these increases to the adoption of improved seed varieties, enhanced agronomic practices, and the use of appropriate technologies. Respondents indicated that yields had risen significantly, with some farmers reporting an increase from 8 to 15 bags per acre and others noting yield improvements of up to 50 percent. Local leaders affirmed that this progress resulted from applying skills learned in training, including the adoption of high-quality seeds, fertilizer use, proper spacing, pest control, and line planting. One LC stated, *"Maize yields over the past two to three seasons have increased compared to previous years… increasing from 8 to 15 bags per acre, or achieving a 50 percent increase in yield."*

Extension workers also acknowledged the improved production levels among smallholder farmers, noting a generally high level of maize cultivation across the district. One observed that *"there is a high level of maize production because over 85% of smallholder farmers produce maize in Oyam District,"* while another affirmed that productivity had consistently improved, although at times affected by losses at post-harvest and climate-related challenges. These reflections were echoed by the district commercial officer, who confirmed that *"there is always increased production and productivity."*

The use of improved maize varieties such as DK777, Bazooka, and Longe7H was cited as a key contributor to yield enhancement. The project officer highlighted that these varieties, coupled with the knowledge gained through training, helped farmers achieve better outcomes: *"The current level of maize production has increased due to the knowledge gained, even researchers have released new varieties… which farmers are planting thus increase in yield."* Respondents agreed that improved seeds offered better resistance to pests and environmental stress, enhancing resilience and output quality.

Enhanced agronomic practices were also identified as transformative in improving yields. Farmers reported that before training, they planted insufficient seed quantities due to limited knowledge of plant population requirements. As one LC explained, *"I used to plant only 3 kg per acre instead of 10 kg… Using fertilizer and line planting has helped me understand and manage the proper plant population in the garden."* Another confirmed, *"There has been a significant increase in the volume of maize produced… simply because I did not know the correct quantity of seeds needed per acre. World Vision helped me with that."*

Focus group discussions further reinforced the impact of training on production, with one participant noting, *"We have seen a lot of positive change in our maize production… since applying the knowledge and skills gained from World Vision, our yields have increased significantly."* Others reported improvements not only in quantity but also in maize quality, emphasizing a reduction in pest infestation and better overall performance: *"Since participating in the program… the quality of maize has increased compared to when we planted local seed varieties, and there has been a noticeable reduction in pest infestations."*

Despite these positive outcomes, challenges were still acknowledged. The project officer noted that unfavorable market conditions discouraged some farmers from expanding production, with low maize prices limiting motivation. Additionally, limited use of fertilizers by some farmers and continuous cultivation on the same land were cited as factors contributing to potential yield decline over time. Pest and disease pressure, particularly from fall armyworms during dry seasons, was reported as a recurring issue causing substantial losses.

Technology introduction, such as the use of hand shelling machines and simple irrigation systems, contributed to improved post-harvest efficiency and helped farmers maintain consistency. Respondents observed that access to such tools facilitated better handling and processing, reducing labor demands and minimizing post-harvest damage.

4.3.2 Satisfaction

This section examines farmers' satisfaction with various aspects of maize production. The levels of agreement and disagreement provide insight into how farmers feel about their financial returns, harvests, and overall engagement with maize farming. The interpretations below highlight where farmers feel confident and where there are signs of concern or unmet expectations.

Table 6: Satisfaction

No.	Statements on Satisfaction	SD	D	SD+D	NS	A	SA	A+SA
		%	%	%	%	%	%	%
1	I am satisfied with the returns I get from maize production.	3.1	22.3	25.4	1.5	63.1	10	73.1
2	I feel that maize farming meets my expectations as a source of livelihood.	2.3	19.2	21.5	3.8	60.8	13.8	74.6
3	I am proud of my achievements in maize farming.	0	10	10	0.8	60.8	28.5	89.3
4	I am satisfied with the output of my harvest last season	0.8	15.4	16.2	8.5	64.6	10.8	75.4
5	I am satisfied with the number of amounts of money earned from my harvests last season.	5.4	23.8	29.2	18.5	43.8	8.5	52.3
6	I enjoy being involved in maize production activities.	1.5	3.8	5.3	1.5	53.1	40	93.1
	Average	2.18	15.75	17.93	5.77	57.70	18.60	76.30

SD – Strongly Disagree, D – Disagree, N – Not sure, A – Agree, SA – Strongly Agree

Source: Primary Data, 2025

The results in table 11 show that; a total of 73.1% of respondents agreed that they are satisfied with the returns they get from maize production, while 25.4% disagreed. While most farmers appear content with their returns, the relatively high level of dissatisfaction suggests that for a significant number, income from maize farming may fall short of their needs or expectations. When asked whether maize farming meets their expectations as a source of livelihood, 74.6% agreed and 21.5% disagreed. The statement "I am proud of my achievements in maize farming" received strong support, with 89.3% agreement and only 10% disagreement. Satisfaction with last season's harvest output was also fairly high, with 75.4% agreement and 16.2% disagreement. In contrast, only 52.3% of respondents agreed they were satisfied with the amount of money earned from their harvests last season, while 29.2% disagreed and 18.5% were neutral. This was the weakest area of satisfaction. The strongest agreement came from the final statement, with 93.1% saying they enjoy being involved in maize production and only 5.3% in disagreement. This shows that despite financial pressures or inconsistent returns, most farmers are highly engaged and find value and enjoyment in their work.

On average, 17.93 percent of respondents disagreed with the statements on satisfaction, while 76.30 percent agreed. This indicates that most respondents are generally satisfied with various aspects of maize farming, though there is a smaller group whose expectations and experiences are less positive.

Analysis of the responses showed a strong sense of satisfaction among participating farmers, largely driven by increased knowledge and growing confidence in their agricultural capabilities. Many farmers reported feeling proud of the visible improvements in their yield performance after implementing the techniques learned during training sessions. This empowerment resulted not only from the technical skills acquired but also from the practical application of those innovations, which reinforced their belief in modern agronomic practices.

Participants consistently acknowledged the value of the training received, regarding it as timely, practical, and directly applicable to their daily farming activities. While the sessions were appreciated, several respondents suggested the need for extended training durations and broader inclusion of more farmers within the community, noting that the current structure sometimes left eager participants out due to limited coverage. This reflects a strong demand for continuous capacity building and deeper engagement.

Furthermore, satisfaction was enhanced by a ripple effect at the community level. Early adopters of the improved practices achieved noticeable success in their yields and crop management, which in turn encouraged others to express interest and participate. This peer influence fostered motivation, resulting in wider uptake of the recommended practices and improved community collaboration. The tangible results observed by fellow farmers acted as a catalyst for broader adoption, reinforcing overall satisfaction with the program.

4.3.3 Income security

This section explores how farmers perceive income security from maize farming. By looking at the percentages of agreement and disagreement, a clearer picture of how confident farmers feel about their ability to meet household needs, maintain stable income, and save from maize-related earnings was got. The following interpretations reflect both the strengths and uncertainties that farmers experience in relation to income from maize production.

Table 7: Income security

No.	Statements on Income Security	SD	D	SD+D	NS	A	SA	A+SA
		%	%	%	%	%	%	%
1	Income from maize farming meets most of my household needs.	3.8	30.8	34.6	6.9	47.7	10.8	58.5

2	Maize farming provides me with a stable source of income.	0.8	22.3	23.1	3.8	58.5	14.6	73.1
3	I can save money from the proceeds of maize farming.	0	7.7	7.7	1.5	77.7	13.1	90.8
4	My financial situation improves during maize harvesting seasons.	0	13.1	13.1	2.3	55.4	29.2	84.6
5	I rarely face income shortages due to my maize farming.	1.6	25.6	27.2	2.3	48.1	22.5	70.6
6	I consider maize farming a reliable source of income.	1.5	22.3	23.8	2.3	38.5	35.4	73.9
	Average	1.28	20.30	21.58	3.18	54.32	20.93	75.25

SD – Strongly Disagree, D – Disagree, NS – Not sure, A – Agree, SA – Strongly Agree

Source: Primary Data, 2025

The results in table 12 reveal that, only 58.5% of respondents agreed that income from maize farming meets most of their household needs, while 34.6% disagreed. This relatively low level of agreement suggests that many farmers find it difficult to rely on maize farming alone to cover essential expenses. When asked if maize farming provides a stable source of income, 73.1% agreed, but 23.1% disagreed. While the majority view it as a reasonably stable source, nearly a quarter of respondents feel their income is inconsistent or unpredictable. A strong 90.8% agreed that they are able to save money from the proceeds of maize farming, with only 7.7% in disagreement. 84.6% of respondents agreed that their financial situation improves during maize harvesting seasons, while only 13.1% disagreed. Responses to whether farmers rarely face income shortages due to maize farming were mixed. While 70.6% agreed, 27.2% disagreed. This indicates that income gaps are still a real concern for many. 73.9% of respondents said they consider maize farming a reliable source of income, with 23.8% disagreeing.

On average, 21.58 percent of respondents disagreed with the statements on income security, while 75.25 percent agreed. This suggests that most respondents view maize farming as contributing positively to their household income and financial stability, though a notable minority do not share this confidence.

Findings revealed significant improvements in income security among farmers, predominantly driven by increased yields resulting from enhanced agricultural practices and access to quality inputs. Many participants reported that the higher production levels had translated into

improved household income, enabling them to meet essential needs such as paying school fees and providing for their families more consistently. As one extension worker noted, *the growth in maize productivity directly contributed to raised income levels and strengthened household food security*.

Stability in food availability was also highlighted as a key outcome, with several households now experiencing reliable food supply throughout the year, thereby reducing periods of scarcity. This was attributed to better farming techniques and increased adoption of improved seed varieties, which enhanced both productivity and resilience. Some farmers recounted that *they previously avoided maize production due to poor performance of local varieties, but after receiving training and improved seeds through World Vision linkages, they began cultivating the crop and observed progressive improvements each year*. A few acknowledged having temporarily ceased maize production but mentioned resumption following recent gains in yields.

Access to financial services further strengthened income security. Through Village Savings and Loan Associations (VSLA) and Vision Fund, farmers were able to acquire small loans to buy inputs and expand their farming operations. This financial inclusion enabled greater investment in production and improved their ability to cope with cash flow constraints.

Additionally, training on market analysis and pricing strategies empowered farmers to negotiate better with buyers, improving their market engagement and selling capacity. However, despite these advancements, persistent constraints were reported, including low farm-gate prices, unreliable buyers, and increasing input costs, which continue to limit the extent of income gains. These challenges highlight the need for further support in value addition, market linkage development, and input subsidy mechanisms to consolidate income security advancements.

4.4 Capacity Building and Maize production performance

This section examines the relationship between farmers' participation in capacity-building interventions and their maize production performance. It explores how training, mentoring, and peer learning contribute to improvements in farming practices, yield levels, and post-harvest handling. The analysis highlights whether farmers who actively engaged in capacity-building activities experienced better outcomes in terms of productivity, income stability, and food security compared to those with limited or no participation.

Table 8 showing the correlation between capacity building and maize production performance

Correlations			
		Farmers' Capacity Building	Maize production performance
Farmers' Capacity Building	Pearson Correlation	1	0.586**
	Sig. (2-tailed)		0.000
	N	130	130
Maize production performance	Pearson Correlation	0.586**	1
	Sig. (2-tailed)	0.000	
	N	130	130

**. Correlation is significant at the 0.01 level (2-tailed).

The data shows a statistically significant positive correlation between farmers' capacity building and maize production performance, with a Pearson correlation coefficient of 0.586. This indicates a moderate to strong relationship, meaning that as farmers gain more training, support, or resources, their maize production tends to improve. The significance level (p = 0.000) confirms that this finding is unlikely to be due to chance. In short, enhancing farmers' capacity is closely linked to better outcomes in maize production.

Table 9 showing the regression analysis on the influence of Farmers' Capacity Building on Maize production performance

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.638[a]	.407	.393	1.57265

a. Predictors: (Constant), Mentoring, Training, Peer Learning and Networking

The regression model examined the effect of training, peer learning and networking, and mentoring on maize production performance. The model has an R Square of 0.407, meaning about 40.7% of the variation in maize production performance can be explained by the three predictors of Training, peer learning and networking and mentoring. This indicates a moderate level of explanatory power.

ANOVA[a]

Model	Sum of Squares	Df	Mean Square	F	Sig.

1	Regression	213.642	3	71.214	28.794	.000[b]
	Residual	311.627	126	2.473		
	Total	525.268	129			

a. Dependent Variable: Maize production performance

b. Predictors: (Constant), Mentoring, Training, Peer Learning and Networking

The ANOVA results show that the model is statistically significant, with a p-value less than 0.001. This means that, overall, the combination of training, peer learning and networking, and mentoring has a significant impact on maize production performance. In other words, the predictors taken together contribute meaningfully to explaining the differences in production performance among farmers.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.485	1.297		-.374	.709
	Training	1.432	.262	.410	5.460	.000
	Peer Learning and Networking	1.308	.325	.345	4.023	.000
	Mentoring	.050	.257	.016	.193	.848

a. Dependent Variable: Maize production performance

Looking at the individual predictors, training and peer learning and networking are both strong and significant contributors. Training has the highest effect ($B = 1.432$, $p < 0.001$), indicating that as training increases, so does maize production performance. Peer learning and networking also have a positive effect ($B = 1.308$, $p < 0.001$). Mentoring, however, does not show a significant relationship with production performance ($B = 0.050$, $p = 0.848$), suggesting that it may not play a meaningful role in this model. This implies that practical skills and shared experiences through training and peer interactions are more influential than mentoring alone.

4.5 The moderating effect of environmental factors on the relationship between farmers' capacity building and maize production performance among smallholder farmers in Oyam District

This section explores how environmental factors influenced the relationship between farmers' capacity-building efforts and maize production performance. While capacity-building interventions such as training, mentoring, and peer learning aimed to improve productivity, external conditions such as weather variability and market dynamics played a role in either supporting or limiting the outcomes of these interventions. The analysis investigates whether farmers who received similar capacity-building support achieved different results due to differences in environmental conditions. Understanding this moderating effect provides deeper insight into how external factors shape the effectiveness of development programs and highlights the need for adaptive strategies that account for environmental risks.

Moderation analysis

Model : 1
Y : MPP (Maize Production Performance)
X : FCB (Farmers' Capacity Building)
W : EF (Environmental Factors)

Sample
Size: 130

****

OUTCOME VARIABLE: MPP

Model Summary

R	R-sq	MSE	F	df1	df2	P
0.586	0.344	2.737	21.977	3	126	0.000

Model

	coeff	se	t	p	LLCI	ULCI
constant	3.417	15.752	0.217	0.829	-27.756	34.59
FCB	0.61	1.266	0.482	0.631	-1.895	3.115
EF	-0.371	2.097	-0.177	0.86	-4.521	3.779
Int_1	0.033	0.169	0.199	0.843	-0.3	0.367
Int_1	0.033	0.169	0.199	0.843	-0.3	0.367

Product terms key:
Int_1 : FCB x EF

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	0	0.039	1	126	0.843

Focal predict: FCB (X)

Mod var: EF (W)

The moderation analysis was conducted to examine whether environmental factors influence the strength or direction of the relationship between farmers' capacity building (FCB) and maize production performance (MPP). In this model, FCB is the independent variable, MPP is the outcome variable, and environmental factors (EF) are tested as a moderator.

The overall model is statistically significant, with an F-value of 21.977 and a p-value of 0.000, indicating that the combination of farmers' capacity building, environmental factors, and their interaction significantly explains variance in maize production performance. The model has an R value of 0.586 and an R-squared value of 0.344, meaning about 34.4% of the variance in maize production performance is explained by the variables in this model. This is consistent with previous results, suggesting that the base relationship between FCB and MPP remains stable.

However, when examining the individual coefficients, the results tell a different story about the role of environmental factors. The main effect of farmers' capacity building (coefficient = 0.610, p = 0.631) is no longer statistically significant in this model, possibly due to the inclusion of interaction terms or collinearity. The main effect of environmental factors is also non-significant (coefficient = -0.371, p = 0.860), suggesting that on their own, environmental conditions do not have a measurable direct effect on maize production performance in this sample.

Most importantly, the interaction term (FCB × EF), which represents the moderating effect, is not statistically significant (coefficient = 0.033, p = 0.843). The confidence interval for this effect ranges from –0.300 to 0.367, which crosses zero and further confirms that there is no meaningful interaction. The test of the highest-order interaction also supports this, with an R-squared change of 0.000, an F-value of 0.039, and a p-value of 0.843. This means that the inclusion of the interaction term did not improve the model's ability to predict maize production performance.

In summary, while farmers' capacity building alone shows a positive relationship with maize production performance, environmental factors do not significantly moderate this relationship. That is, the effect of capacity building on maize yields appears to be consistent regardless of whether environmental conditions are favorable or not. These results suggest that interventions aimed at improving farmer capacity are likely to be beneficial across different environmental

contexts, although further research might be needed to explore the specific environmental conditions that could interact with farmer training and support.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.0 Introduction

This chapter presents a detailed discussion of the study's key findings regarding the farmers' capacity-building, maize production performance, the influence of farmers' capacity building on maize production performance and the moderating effect of environmental factors on the relationship between farmers' capacity building and maize production performance among smallholder farmers.

5.1 Capacity building initiatives among smallholder farmers

The study found that training reached most farmers and was viewed as practical, timely, and directly relevant to their farming needs. Nearly all respondents reported receiving training in modern maize production, climate-smart agriculture, post-harvest handling, and good agronomic practices, and many could recall specific techniques that they later applied in their fields. Farmers also recognized the value of financial literacy and market-oriented training, though access to these sessions was not always uniform. This means that the training component of the project successfully strengthened technical knowledge, supported adaptation to changing climate conditions, and helped farmers approach production with a more business-minded outlook. The results are consistent with studies by Bisht et al., (2020) and Kalimba & Culas, (2020), which highlight the importance of practical, climate-smart instruction for improving smallholder resilience. They also reflect findings from Bizikova et al., (2020) and Prasad, (2019), who show that a mix of agronomic and market-focused training improves farmer capacity. The study suggests the need to expand financial literacy and business skills training to reach more groups and to introduce periodic refresher sessions so that farmers can reinforce and retain what they have learned over time.

The study found that peer learning played a major role in how farmers shared experiences, solved challenges, and developed confidence in improved practices. Most farmers reported engaging in farmer groups, observation of demonstration plots, and exchange visits, which helped them better understand and trust new technologies. These interactions also helped strengthen market linkages and collective marketing efforts. This means that peer networks acted as an important complement to formal training by offering continuous, practical learning in real-life settings. Participation in farmer field days and local exhibitions was low, this is

attributed to the transport challenges to the venues this is because the organization held fewer field events. The findings are consistent with Izuchukwu et al., (2023) and Silvert et al., (2022), who show that farmer-to-farmer exchanges are central to knowledge diffusion, and with Sutherland & Marchand, (2021), who emphasize the effectiveness of demonstration-based learning. However, challenges such as inconsistent attendance, competing household responsibilities, and expectations for incentives echo the concerns raised by Nicol & Taherzadeh, (2020) and Landicho & Ramirez, (2023) about the limitations of community-based learning systems. The study suggests the need to strengthen the facilitation of farmer groups, ensure more inclusive participation, and provide resources that allow peer learning activities to run consistently throughout the farming calendar.

The study found that mentoring strengthened farmers' ability to apply what they learned, improved decision making, and increased confidence in maize production. Most respondents indicated that mentors were accessible, supportive, and reliable sources of guidance, and many attributed improvements in yields, financial planning, and technology adoption to the follow-up support they received. This means that mentoring helped bridge the gap between training and practice by offering individualized support and ensuring that skills translated into tangible change in the field. The results are consistent with Mwadzingeni et al., (2025) and Li et al., (2024), who argue that coaching and continuous support are essential for sustained adoption of new technologies, and with Woltering et al., (2022), who note that layered capacity-building approaches create stronger, longer-lasting results. The concerns raised about irregular follow-up visits align with the broader literature describing resource constraints in extension systems, including the work of Kalimba & Culas, (2020) and Van Loon et al., (2020). The study suggests the need to strengthen the frequency and consistency of mentoring visits, ensure adequate staffing for extension support, and integrate community-based mentors who can provide closer and more regular guidance.

The findings reflect a capacity-building model that aligns well with best practices documented in current research. The combination of practical training, strong peer networks, and sustained mentoring created an environment that encouraged learning, experimentation, and adoption of new technologies. The high agreement levels across the survey responses reflect the strength of this integrated approach. At the same time, the challenges noted around inclusiveness, follow-up, and resource limitations echo the broader literature, suggesting that further strengthening of extension support and wider coverage would enhance the long-term sustainability and impact of the project.

5.2 Maize Production Performance among small holder farmers

The study found that most farmers reported clear improvements in their maize yields after the capacity-building interventions. A large majority agreed that their yield per acre had increased, that improved practices resulted in higher output, and that their current yields were better than those of the past two years. Farmers attributed these gains to improved seed varieties, better agronomic practices, fertilizer use, and technologies that supported production and post-harvest handling. Testimonies from local leaders, extension workers, and farmers confirmed increases from about eight to fifteen bags per acre for many households. This means that the interventions helped farmers translate acquired knowledge into tangible productivity gains. Improved seed adoption, proper spacing, pest control, and planting techniques strengthened output and improved crop resilience. The low percentage of farmers who felt their maize yields were above the community average this is attributed to ongoing production challenges, including limited access to quality seed and fertilizer, poor soil fertility, unreliable rainfall, pest and disease pressure, and inadequate extension support, along with financial constraints, limited mechanization, late planting, and the influence of comparing themselves to better-resourced neighbors or past disappointing harvests. The findings are consistent with studies such as Gebre et al., (2021) and Worku et al., (2020), which show that stress-tolerant and improved maize varieties significantly raise yields among smallholders. They also align with Ichami et al., (2019) and Mutuku et al., (2020), who demonstrate that fertilizer use and integrated soil fertility management produce strong productivity responses. The study suggests the need to support farmers with timely access to quality inputs, expand fertilizer use through subsidies or credit, and strengthen pest control services to sustain yield growth.

The study found that farmers were generally satisfied with their maize production outcomes. Many felt proud of their achievements, appreciated their harvest volumes, and enjoyed maize farming. Satisfaction was closely linked to observable improvements in performance after applying skills from training. While most farmers were satisfied with returns, a notable share was less content with the income earned from the previous season, indicating that financial expectations were not always met. This means that capacity building increased farmers' confidence and engagement, but income-related satisfaction remained sensitive to market prices and production costs. Satisfaction also grew through peer influence as early adopters motivated others by demonstrating visible success. These findings are consistent with Bahtiar et al., (2023), who show that improved varieties enhance both performance and farmer satisfaction, and with Gebeyehu, (2023), who notes that conservation agriculture increases

farmers' confidence when results are visible. They also mirror Abokyi et al., (2020), who highlight that income satisfaction is often shaped by market volatility rather than yield alone. The study suggests the need to strengthen market access, improve price negotiation skills, and extend capacity-building activities to more farmers so that satisfaction can be sustained and widened.

The study found that income security improved for many farmers, driven by increased yields, better input use, and stronger engagement with financial services. Most respondents agreed that maize farming had become a reliable income source, that they were able to save money, and that their financial situation improved during harvesting seasons. However, a substantial number still struggled to meet household needs consistently and faced income shortages during the year. Farmers also benefited from better access to credit through savings groups and Vision Fund, which supported input purchases and reduced cash flow challenges. This means that maize production contributed positively to household stability, but income gains were uneven and at times undermined by low prices, rising input costs, and unreliable buyers. The results align with Olagunju et al., (2021) and Olounlade et al., (2020), who show that maize production improves household food security but may not fully stabilize income without stronger market systems. They also reflect findings from Sinyolo, (2020) and Hlatshwayo et al., (2023), which emphasize that technology adoption increases yields and savings capacity but cannot eliminate vulnerability when market conditions are weak. The study suggests the need to strengthen market linkages, develop value addition opportunities, support farmer cooperatives in collective marketing, and promote input financing models that reduce production risk and improve income security.

Maize production performance among smallholder farmers showed steady improvement across yield levels, satisfaction, and income security. Farmers reported clear increases in output over recent seasons and attributed these gains to the use of improved seed varieties, better crop management, fertilizer application, and technologies that supported both production and post-harvest handling. These improvements strengthened farmers' confidence, with many expressing pride in their achievements and a strong sense of satisfaction with their harvests. Higher yields also contributed to greater income stability for many households by enabling them to meet essential needs more consistently and save during harvest periods. Even so, income security was still constrained for some farmers due to fluctuating prices, rising input costs, and occasional pest outbreaks. The results show that maize production has advanced in both quantity and quality, leading to stronger livelihoods, though continued support in areas

such as market access, input affordability, and pest management will be important for maintaining this progress.

5.3 The influence capacity building initiatives on maize production performance among small holder farmers

The study found a significant positive relationship between farmers' participation in capacity-building activities and their maize production performance. The correlation analysis revealed a moderate to strong association, indicating that farmers who actively engage in training, peer learning, or mentoring are more likely to achieve higher yields, improved farm management, and greater income stability. Regression results further confirmed that capacity-building interventions collectively explain 40.7% of the variation in maize production performance, highlighting their critical role in enhancing productivity. Farmers reported that training sessions and group learning activities provided practical knowledge on improved seed selection, planting techniques, pest management, and post-harvest handling. Extension officers also observed that such interventions strengthened farmers' ability to adopt and sustain improved practices over time. This shows that capacity-building programs act as both technical and behavioral enablers. They not only equip farmers with agronomic skills but also build problem-solving abilities, confidence, and adaptive capacity. Participation in structured learning environments fosters a culture of experimentation and innovation, allowing farmers to respond more effectively to climate variability and market fluctuations. The findings highlight that knowledge transfer alone is not enough continuous engagement and opportunities for peer interaction are essential for meaningful behavioral change and sustained performance improvement.

This is consistent with Li et al., (2024) and Mwadzingeni et al., (2025), who found that access to practical knowledge and continuous training significantly improves smallholder productivity and resilience. It also aligns with Kapari et al., (2023) and Ibitola et al., (2019), who emphasize that education and technical guidance enhance farmers' ability to manage production risks. Similarly, Ngango & Hong, (2021) observed that knowledge-intensive interventions close productivity gaps among smallholders, while Chipfupa et al., (2023) confirmed that skill-building in agronomy directly translates into higher yields and improved farm outcomes.

This means that capacity building extends beyond skill acquisition; it cultivates confidence, motivation, and long-term commitment to innovation. Farmers emphasized that structured training combined with collaborative learning provided a supportive environment that

encouraged them to experiment and adapt continuously. Such psychological and social benefits are as critical as technical ones, as noted by Mwadzingeni et al., (2025), who argue that farmer confidence and engagement are key drivers of sustained practice adoption.

5.4 The moderating effect of environmental factors on the relationship between capacity building and maize production performance among small holder farmers

The study found that environmental factors do not significantly moderate the relationship between farmers' capacity building and maize production performance. In simple terms, the positive effect of training, peer learning, and mentoring on productivity remained consistent regardless of environmental conditions. This means that while capacity building directly improves maize production outcomes, environmental variations such as rainfall fluctuations or soil fertility differences did not substantially alter this relationship.

This finding is somewhat unexpected, given that environmental conditions are widely recognized as major influences on agricultural productivity. One possible explanation is that capacity building equips farmers with adaptive skills that help them manage or mitigate environmental challenges. Farmers who receive training are often better able to adjust planting times, adopt drought-tolerant varieties, and use soil conservation techniques, thereby reducing their vulnerability to climate variability. Li et al., (2024) similarly found that knowledge transfer and technical training foster resilience and enable farmers to sustain production even under environmental stress. In this context, capacity building may serve as a stabilizing factor, buffering the negative effects of environmental constraints on yield outcomes.

However, qualitative evidence provides a more nuanced picture. Farmers frequently mentioned that environmental challenges such as erratic rainfall, declining soil fertility, and drought remain major barriers to fully realizing the benefits of training. These conditions limit the practical application of learned techniques, particularly when essential inputs like fertilizer and water are scarce. This observation aligns with Adeagbo et al., (2021), who noted that climate variability often hinders smallholder farmers' ability to implement adaptive strategies, and with Mutengwa et al., (2023), who argue that even well-designed climate-smart interventions face limits under extreme environmental stress.

The absence of a statistically significant moderating effect may also be due to the way environmental variables were measured. It is possible that the indicators used did not fully capture the range or intensity of environmental constraints faced by farmers. Studies such as Grote et al., (2021) and Elias et al., (2019) emphasize that agricultural performance depends

on complex interactions between biophysical and socioeconomic factors, suggesting that a broader analytical framework could yield a more comprehensive understanding of how environment influences production outcomes.

Market-related factors also emerged as important indirect influences. Farmers described how fluctuating maize prices, high input costs, and poor market infrastructure discouraged continued investment in improved practices. These economic pressures, although not environmental in a strict sense, interact with climatic conditions to constrain productivity and income stability. Asfaw et al., (2024) and Amegnaglo, (2020) note that without stable markets and supportive value chains, the benefits of capacity building are often diluted, as farmers cannot consistently apply or profit from new skills.

This finding is consistent with studies advocating for integrated approaches to agricultural development. Bowles et al., (2020) and Yu et al., (2022) argue that diversification, crop rotation, and resource management are essential for building resilience to environmental stress. Similarly, linking capacity building with interventions that address soil health, water management, and climate adaptation can strengthen the overall impact on productivity and income.

In summary, while environmental factors did not significantly moderate the link between capacity building and maize production performance in this study, they remain critical external constraints. The findings suggest that training and knowledge transfer help farmers cope with environmental challenges, but sustained improvements require complementary investments. Future programs should combine capacity building with interventions that enhance climate resilience, restore soil fertility, and strengthen input and market systems. Such an integrated approach would ensure that the gains from training are not only achieved but also sustained under changing environmental conditions.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

This chapter presents a summary of the major findings of the study, draws conclusions based on those findings, and offers practical recommendations for various stakeholders. The study examined the relationship between farmers' capacity building initiatives and maize production performance among smallholder farmers under the Resilience and Livelihood Project in Oyam District.

6.1 Summary of the findings

Capacity building initiatives strengthened the skills of smallholder farmers by exposing them to modern farming methods, post-harvest handling, good agronomic practices, climate-smart techniques, and basic business skills. Many farmers felt confident applying what they learned, particularly in improved seed selection, proper spacing, fertilizer use, mulching, and water conservation, although exposure to pest management varied because training frequency differed across communities. Practical teaching approaches such as demonstration gardens, field visits, group discussions, and radio programs made it easier to apply new knowledge, while peer learning allowed farmers to share experiences and solve challenges together. Mentorship from experienced farmers further supported decision making and built confidence, even though access to mentors was not always consistent. Overall, farmers reported that these combined learning opportunities improved their ability to adopt technologies, plan their enterprises, manage resources, and respond effectively to production challenges.

Maize production performance among smallholder farmers has shown noticeable improvements in both yield and farming practices. Many farmers reported increased output per acre, largely due to the adoption of improved techniques such as correct spacing, use of quality seeds, and timely planting. While most expressed satisfaction with their harvests and took pride in their achievements, a portion felt that returns did not always match the labor and investment required, highlighting challenges with income and pricing. Yield targets were not consistently met by all farmers, affected by factors such as weather variability, pest outbreaks, and fluctuating input costs, leading to uneven performance across communities. In terms of income security, harvest periods provided temporary financial relief, enabling some farmers to meet household needs and save, though earnings were not always stable throughout the year.

Therefore, farmers found maize farming rewarding and valuable as a livelihood, even as some continued to face economic and environmental challenges that limited consistent gains.

The influence of capacity building on maize production performance among smallholder farmers was strongly positive, with training, mentoring, and peer learning accounting for a significant portion of performance improvements. Farmers who received more support were more likely to adopt improved seeds, apply better pest control, plant consistently, and approach farming with a business mindset, resulting in higher yields over multiple seasons. Capacity-building efforts also promoted collaboration through group planning, joint marketing, and information exchange, while skills in budgeting, saving, and input management enhanced decision-making at both individual and group levels. Although challenges such as erratic weather, soil degradation, high input costs, and market barriers persisted, environmental factors did not weaken the link between capacity building and production, indicating that these initiatives are effective across varying conditions. Overall, capacity building provided practical tools and confidence that consistently improved maize production outcomes, even as external constraints continued to limit the full potential of farmers' gains.

The moderating effect of environmental factors on the relationship between farmers' capacity building and maize production performance indicates that environmental conditions do not significantly alter this relationship. While the overall model shows that farmers' capacity building, environmental factors, and their interaction collectively explain variation in maize yields, neither the direct effect of environmental factors nor the interaction term is statistically significant. This suggests that the positive impact of capacity-building initiatives on maize production remains consistent regardless of variations in weather, soil, or other environmental conditions. In other words, efforts to improve farmers' skills, knowledge, and practices are likely to enhance maize performance across different contexts, although further investigation may help clarify how specific environmental conditions might influence outcomes in more detail.

6.2 Conclusion

The study shows that farmers' capacity building has led to meaningful improvements in maize production performance among smallholder farmers. Training programs have equipped farmers with the knowledge and skills needed to adopt better agronomic practices, improve post-harvest handling, and use climate-smart techniques. Peer learning and mentoring have further reinforced these efforts, fostering a culture of knowledge sharing, collaboration, and

confidence among farmers. Maize yields have generally improved over recent seasons, with most farmers reporting better productivity and increased satisfaction with their work. However, some continue to face challenges in consistently meeting yield targets, and not all feel they are performing above average. While farmers take pride in their work and enjoy maize farming, financial returns have not always matched expectations, particularly due to market and environmental constraints. Environmental factors such as weather variability and unstable market conditions continue to influence production outcomes. Although these factors have not significantly weakened the effect of capacity building on yields, they remain a barrier to fully realizing the benefits of training. Inconsistent rainfall, unreliable buyers, and limited access to timely market and weather information continue to impact farmer performance and income security. Despite these challenges, the link between training and improved maize production remains strong. Capacity-building programs have helped farmers improve planning, adopt new technologies, and make more informed decisions. They have also led to better financial practices, stronger group coordination, and greater resilience to climate shocks.

6.3 Recommendations

Smallholder farmers should stay engaged in training, mentoring, and peer learning. Applying improved practices in land preparation, seed selection, timely planting, pest control, and post-harvest handling will help sustain yield gains. Farmers are encouraged to work more closely in groups to lower input costs, strengthen bargaining power, share information, and tackle production challenges together. Regular participation in nearby farmer field days and low-cost practical demonstrations will further enhance learning.

Non-governmental organizations supporting agriculture and livelihoods should continue offering integrated training that combines agronomy with financial and business skills. They should decentralize events, bring demonstrations closer to farming communities, and organize several field days each season in different locations. Practical, low-cost demonstrations can help reach many smallholder farmers. Improving access to quality seed, fertilizers, soil amendments, and affordable credit should remain a priority, along with promoting soil testing, integrated soil fertility management, and effective pest and disease control. Support for farmer cooperatives and self-help groups should be expanded to strengthen collective purchasing and improve market access.

Government involvement is essential to maintain progress. This includes continued support for subsidized quality inputs and storage options, especially for farmers in high-risk areas.

Investment in rural infrastructure such as feeder roads and storage facilities will ease market access and reduce losses. Strengthening public extension services and ensuring they are well-equipped will expand consistent farmer support. Collaboration between government, NGOs, and the private sector will help build a resilient agricultural system that offers practical solutions to the challenges farmers face.

Extension workers should increase follow-up visits after training and offer hands-on guidance tailored to each farmer's needs. Training should be spread evenly across communities so that remote farmers are not overlooked. Areas where adoption was weaker, including pest management and climate-smart practices, need greater emphasis. Demonstration gardens, farmer field schools, and decentralized field days should remain core teaching methods because they offer practical learning that farmers can apply immediately.

Local leaders should continue mobilizing farmers for training and encourage ongoing group participation. They can strengthen knowledge sharing by helping coordinate regular meetings during the main farming seasons and by identifying local issues that limit adoption of improved practices. Their role as a link between farmers, extension workers, and project teams is important for ensuring that community concerns are heard and addressed.

6.4 Areas for further research

i. Effect of farmer mentorship on adoption of climate-smart agriculture
ii. Influence of access to market information on maize pricing decisions
iii. Relationship between farmer group participation and input accessibility
iv. Impact of training consistency on yield stability
v. Effect of post-harvest handling practices on income security
vi. Role of extension service frequency in farmer decision-making

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APPENDICES

Appendix I: Questionnaire for the respondents

Dear Respondent,

My name is Caroline Adongo, a student at Gulu University pursuing a Master's degree in Monitoring and Evaluation under the Faculty of Business. I am currently conducting a research study on ***Farmers' Capacity Building Initiatives and Maize Production Performance among Smallholder Farmers in Oyam District***. You have been selected to participate in this study because your views and experiences as a beneficiary of World Vision trainings are highly valued.

The study involves completing a survey that will take **approximately 45 minutes**. Your participation is completely voluntary, and you may choose to withdraw from the study at any time without facing any negative consequences. Your responses will remain anonymous and all information collected will be kept strictly confidential and used solely for academic purposes. Your name or identity will not be revealed in any reports or publications resulting from this research.

Your insights are important and will help generate useful knowledge for improving support to farmers in the region. By choosing to proceed with this survey, you are providing your informed consent to participate in the study. If you have any questions or concerns before we begin, I will be happy to address them.

Thank you for your valuable time and contribution.

Section A: Demographic Characteristics

Please tick (√) the appropriate box or provide the requested information.

1. **Age:**

☐ 18-25 ☐ 26-35 ☐ 36-45 ☐ 46-55 ☐ Above 55

2. **Sex:**

☐ Male ☐ Female

3. **Marital status:**

☐ Single ☐ Married ☐ Divorced ☐ Separated ☐ Widowed

4. **Number of children**:

☐ None ☐ 1-2 ☐ 3-4 ☐ 5+

5. **Educational level:**

☐ Primary school ☐ Secondary school ☐ Vocational/technical school ☐ College/university

6. **Occupation:**

☐ Full-time farmer ☐ Part-time farmer ☐ Off-farm employment

7. **Years of farming experience**:

☐ Less than 5 years ☐ 5-10 years ☐ 11-20 years ☐ 21-30 years ☐ Above 30 years

Average annual income:

☐ Less than UGX 1,000,000 ☐ UGX 1,000,000-UGX 2,000,000 ☐ UGX 2,000,000-UGX 5,000,000

☐ UGX 5,000,000-UGX 10,000,000 ☐ Above UGX 10,000,000

8. Farm size (in acres):

☐ Less than 1 ☐ 1-2 ☐ 2-5 ☐ 5-10 ☐ Above 10

9. Main crops grown:

☐ Maize ☐ Cassava ☐ Groundnut ☐ Millet ☐ Sorghum ☐ Cotton ☐ Bananas

☐ Sweet potatoes ☐ Coffee ☐ Others (please specify) _____

Section B: Farmers' Capacity Building

Please tick (√) the appropriate box or provide the requested information. Please indicate your level of agreement with each statement using the following options: Strongly Disagree (SD), Disagree (D), Not Sure (NS), Agree (A) and Strongly Agree (SA).

Part I: Training

No.	Statement	SD	D	NS	A	SA
1	I have received adequate training on Modern maize farming techniques.					
2	I have been trained on Post-harvest handling					
3	I have been trained on good agronomic practices					
4	I have been trained on Integrated Pest Management					
5	I have been trained on Climate smart agriculture					
6	Training has helped me adopt new technologies in maize production.					

Part II: Peer Learning & Networking

No.	Statement	SD	D	NS	A	SA
1	I regularly interact with other farmers to share maize farming experiences.					
2	I have learned better maize farming practices through farmer groups.					
3	Networking with other farmers has improved my knowledge and productivity.					
4	I actively participate in farmer field days and local exhibitions.					

5	Peer learning has helped me solve practical farming challenges.					
6	I consider my network of fellow farmers a key source of information.					

Part III: Mentoring

No.	Statement	SD	D	NS	A	SA
1	I have access to experienced farmers who mentor me in maize farming.					
2	Mentoring has helped me improve my maize production methods.					
3	I can rely on a mentor for advice during difficult farming situations.					
4	Mentors help me stay updated with current agricultural trends.					
5	I frequently consult my mentor before making farming decisions.					
6	Mentoring has enhanced my confidence in maize farming.					

Section C: Maize Production Performance

Please tick (√) the appropriate box or provide the requested information. Please indicate your level of agreement with each statement using the following options: Strongly Disagree (SD), Disagree (D), Not Sure (NS), Agree (A) and Strongly Agree (SA).

Part I: Yield Level

No.	Statement	SD	D	NS	A	SA
1	My maize yield per acre has increased over the past seasons.					
2	I consider my maize yields satisfactory compared to my effort.					
3	I achieve higher yields when I follow improved farming practices.					
4	My farm produces more maize now than it did two years ago.					
5	I consistently reach my maize yield targets each season.					
6	My maize yield level is above the average in my community.					

Part II: Satisfaction

No.	Statement	SD	D	NS	A	SA
1	I am satisfied with the returns I get from maize production.					
2	I feel that maize farming meets my expectations as a source of livelihood.					
3	I am proud of my achievements in maize farming.					
4	I am satisfied with the output of my harvest last season					

5	I am satisfied with the ~~number~~ of amounts of money earned from my harvests last season.					
6	I enjoy being involved in maize production activities.					

Part III: Income Security

No.	Statement	SD	D	NS	A	SA
1	Income from maize farming meets most of my household needs.					
2	Maize farming provides me with a stable source of income.					
3	I can save money from the proceeds of maize farming.					
4	My financial situation improves during maize harvesting seasons.					
5	I rarely face income shortages due to my maize farming.					
6	I consider maize farming a reliable source of income.					

Section D: Environmental Factors

Please tick (√) the appropriate box or provide the requested information. Please indicate your level of agreement with each statement using the following options: Strongly Disagree (SD), Disagree (D), Not Sure (NS), Agree (A) and Strongly Agree (SA).

Part I: Market Conditions

No.	Statement	SD	D	NS	A	SA
1	I have access to fair and competitive maize markets.					
2	The prices of maize in the market influence my farming decisions.					
3	I face challenges in finding reliable buyers for my maize.					
4	Market demand for maize affects my production volume.					
5	I get timely market information to guide my sales.					
6	Poor market conditions discourage me from producing more maize.					

Part II: Weather Changes

No.	Statement	SD	D	NS	A	SA
1	Weather changes significantly affect my maize production.					
2	I have experienced crop losses due to unpredictable rainfall.					
3	Delayed rains negatively impact my planting schedule.					
4	I struggle to cope with prolonged dry spells during the farming season.					
5	I use timely weather information to plan my maize farming activities.					
6	Climate variability has made maize farming more difficult in recent years.					

Thank you for your time

Appendix II: Key Informant Interview Guide – Capacity Building and Maize Production in Oyam District. (LC1, DPO, DCO, AO, WV. Project Officers).

Section A: Training and Capacity Building

1. What kinds of training or skills development programs have been introduced to improve maize farming practices in Oyam District?
2. Who provides capacity-building support in your area, and how often do you receive such assistance?
3. What training methods or formats are commonly used (e.g., workshops, demonstration plots, farmer field schools)?
4. How frequently are these initiatives implemented?
5. How do you assess farmers' participation and engagement in these initiatives?

Section B: Impact of Training

6. In what ways has the training or support you received influenced your maize production practices or output?

7. Can you share any specific changes or improvements in your maize yields after attending a capacity-building initiative?

8. Do farmers who undergo training adopt new technologies or practices more readily? If yes, which ones?

9. What factors enhance or limit the translation of training into improved maize production?

Section C: Maize Production Status

10. How would you describe your maize yield over the past two to three seasons?

11. How would you describe the current level of maize production among smallholder farmers in the district?

Section D: Challenges and Constraints

12. What challenges do you face that affect your ability to produce maize efficiently and consistently?

13. What are the main constraints affecting maize productivity in this area? 14. What challenges do you face in implementing capacity-building activities?

Section E: Environmental and Market Factors

15. What environmental factors or market conditions (e.g., weather changes) most affect maize production in this district?

16. How do these environmental factors influence the outcomes of capacity-building initiatives?

17. Do some capacity-building strategies work better in certain environmental conditions than others?

18. Are there cases where good training didn't lead to improved production due to environmental challenges?

Section F: Measuring Effectiveness

19. How do you measure the effectiveness or impact of these initiatives?

20. In your opinion, how have capacity-building initiatives impacted maize yields or productivity?

Appendix III: Focus Group Discussion (FGD) Guide

Title;
Farmers' Capacity Building Initiatives and Maize Production Performance among Smallholder Farmers in Oyam District

Researcher;
Caroline Adongo, Gulu University

Introduction;
Good morning/afternoon. Thank you for agreeing to participate in this focus group discussion. My name is Caroline Adongo, a student at Gulu University. I am conducting a study to understand how capacity building initiatives, such as those provided by World Vision, have impacted maize production among smallholder farmers in Oyam District.

The purpose of this discussion is to gather your views and experiences. There are no right or wrong answers we are simply interested in your honest opinions. The discussion will last about 30-40minutes. Your participation is voluntary, and the information you share will be kept confidential.

Section 1: Background Information

1. Can you please introduce yourselves (name, village, how long you have been farming maize)?
2. What is your main source of income?

Section 2: Capacity Building Initiatives

3. What kind of agricultural training or support have you received from World Vision or other organizations?

4. How often do these trainings take place, and how long do they last?

5. What topics or skills were covered in the trainings?

Section 3: Application and Impact

6. How have you applied the knowledge or skills gained from the training to your maize farming?

7. Have you seen any changes in your maize yields or farming practices since participating in these programs?

8. What challenges, if any, have you faced when trying to implement what you learned?

Section 4: Perception and Sustainability

9. What do you think about the quality and relevance of the training provided?

10. Do you feel empowered or more capable as a farmer after attending these trainings? Why or why not?

11. Do you think these capacity-building programs are sustainable or should be improved? If so, how?

Section 5: Recommendations

12. What additional support do you need to improve your maize production?

13. What advice would you give to organizations providing training to farmers in your area?

Closing; Thank you for your time and valuable insights. Your views will greatly contribute to this study and help improve support for smallholder farmers like yourselves.

Tables Representing Subthemes Used During Thematic Content Analysis

Subthemes on training

Subtheme	Description
Climate smart agriculture	Farmers were trained on CSA techniques such as mulching, drought-resistant varieties, and micro-scale irrigation to adapt to changing weather conditions.
Good agronomic practices	Training focused on site selection, spacing, fertilizer and pesticide application, pest and disease control, and timely planting to improve yield.
Post-harvest handling	Farmers learned about drying, storage, and aflatoxin prevention, including the use of tarpaulins and proper shelling techniques.
Farming as a business	Training emphasized farming as an enterprise, including record keeping, cost-benefit analysis, and profit-oriented decision making.
Financial literacy	Farmers were taught budgeting, savings, and how to access credit through savings groups and Vision Fund.
Value chain development	Capacity building helped farmers understand value addition, maize processing, and market linkages to increase income.
Training Frequency	Trainings were conducted weekly, quarterly, or seasonally, depending on topic and farming calendar. Some respondents requested more regular sessions.

Source: Primary Data, 2025

Subthemes on peer learning

Subtheme	Description
Farmer field schools	Practical, hands-on training sites where farmers learn through observation, experimentation, and group discussion.
Demonstration plots	Demo gardens allowed farmers to see visible results of improved technologies and encouraged adoption through evidence.
Exchange visits	Farmers participated in learning tours and agricultural exhibitions (e.g., Jinja, Ngeta) to share experiences and observe best practices.
Farmer groups & cooperatives	Groups facilitated collective learning, bulking, and marketing of maize, improving bargaining power and peer support.
Networking & market linkages	Through cooperatives and NGOs, farmers established relationships with agro-input dealers, buyers, and credit providers.

Source: Primary Data, 2025

Subthemes on mentoring

Subtheme	Description
Technical Mentorship	Extension workers, TOTs, and market facilitators provided one-on-one guidance on GAP, PHH, and CSA in the field.

Follow-up & Supervision	Periodic visits and performance tracking ensured that farmers applied the skills gained from training.
Demonstration Support	Mentors supported establishment of demo gardens and used them for continuous learning and troubleshooting.
Inconsistent Mentorship	Some farmers noted irregular follow-ups and requested more consistent engagement from mentors and extension staff.

Source: Primary Data, 2025

Subthemes on yield level

Subtheme	Description
Increased Productivity	Reported yield increases from 8 to 15 bags per acre due to improved practices and quality seed use.
Improved Seed Varieties	Adoption of improved varieties (e.g., DK777, Bazooka, Longe7H) led to better yields and resilience to pests and drought.
Enhanced Agronomic Practice	Use of correct spacing, fertilizer, pest control, and line planting improved field performance and reduced losses.
Technology Use	Tools like hand shelling machines and small irrigation systems improved post-harvest efficiency and consistency.

Source: Primary Data, 2025

Subthemes on satisfaction

Subtheme	Description
Increased Knowledge & Confidence	Farmers expressed pride and confidence after applying learned techniques and seeing improved yields.
Perceived Value of Training	Respondents found the training relevant and practical but requested longer sessions and inclusion of more farmers.
Community Motivation	Visible success of early adopters motivated other farmers to join and apply new practices.

Source: Primary Data, 2025

Subthemes on income security

Subtheme	Description
Improved Household Income	Higher yields increased earnings, enabling farmers to afford school fees and basic needs.
Food Security	Many households achieved stable food supply, reducing hunger periods.
Access to Credit	Through VSLA and Vision Fund, farmers accessed small loans to purchase inputs and expand production.
Market Understanding	Training on market analysis and price tracking improved farmers' ability to negotiate with buyers.
Constraints	Persistent issues include low farm-gate prices, unreliable buyers, and high input costs.

Source: Primary Data, 2025

Appendix IV: Introductory letter

GULU UNIVERSITY
P.O. Box 166
Gulu, Uganda
Tel: 0471-42923
Fax: 256-471-42094

OFFICE OF THE DEAN FACULTY OF BUSINESS AND DEVELOPMENT STUDIES

Date: 2nd May 2025

TO WHOM IT MAY CONCERN

RE: ADONGO CAROLINE **REG. NO. 23/U/0431/MME/PS**

The above named person is a final year student pursuing Masters of Monitoring and Evaluation (MME) Degree of Gulu University.

In partial fulfillment of the requirements for the award of the Degree, she is carrying out a research on the topic: **Farmers' Capacity Building Initiatives and Maize Production Performance of Smallholder Farmers: A Case Study of Resilience and Livelihood Project in Oyam District.**

Due consideration accorded to her shall be highly appreciated.

Yours Faithfully,

GULU UNIVERSITY 02 MAY 2025 DEAN FACULTY OF BUSINESS AND DEVELOPMENT STUDIES

2/05/2025

Dr. Olanya David Ross (Ph.D)
Vice Chairperson - Higher Degrees' Committee
Faculty of Business and Development Studies
Tel: 0773-170-448
Email: d.olanya@gu.ac.ug

Appendix V: Permission from the Oyam District

DPO
Please handle

ADONGO CAROLINE
Gulu University
P.O.Box 166, Gulu-Uganda
Cadongo.14@gmail.com
0771487567/0707785015

CHIEF ADMINISTRATIVE OFFICER
19 MAY 2025
OYAM DISTRICT LOCAL GOVERNMENT

8th. May. 2025

The Chief Administrative officer,
Oyam District Local Government,
P.O. Box 10, Oyam, Uganda.

Dear Sir/Madam,

RE: REQUEST FOR PERMISSION TO COLLECT DATA IN OYAM DISTRICT

I am a student at Gulu University pursuing a Master's degree in Monitoring and Evaluation. As part of the requirements for the award of this degree, I am conducting a research study titled: **"Capacity Building Initiatives and Maize Production Performance of Smallholder Farmers: A Case of the Resilience and Livelihood Project in Oyam District."**

The purpose of this study is to examine the influence of farmers' capacity-building initiatives on maize production performance among smallholder farmers in Oyam District. The research will specifically focus on farmers whose capacity has been enhanced through the World Vision Resilience and Livelihood Project in Minakulu and Aber Sub-counties. The findings are expected to contribute to academic knowledge and may also provide practical strategies for improving maize production performance in the district.

I kindly seek your permission to collect data within Oyam District. The study will involve interviews and questionnaires administered to selected smallholder farmers, key informants and the technical team at the District and Subcounty level. All information collected will be used strictly for academic purposes and will be treated with utmost confidentiality and in line with ethical research standards.

I will be most grateful for your support and look forward to your positive response.

Yours sincerely,

Caroline

Caroline Adongo

(II) Permission granted.
(III) Agric. Officers Minakulu and Aber Sub-counties
Please receive her and guide during this data collection.

DISTRICT PRODUCTION AND MARKETING OFFICER
19 MAY 2025
DISTRICT

Outlook

Intention to Conduct Research in your Operational Area

From Caroline Adongo <Caroline_Adongo@wvi.org>
Date Tue 5/13/2025 11:52 AM
To Patrick Oluge <Patrick_Oluge@wvi.org>; odongo leo. stephen <leo_odongo@wvi.org>
Cc Emmanuel Akorimo <Emmanuel_Akorimo@wvi.org>; Harriet Aceng Yapi <harriet_yapi@wvi.org>; Nick Owiny <Nick_Owiny@wvi.org>; Ojok Tonny <Tonny_Ojok@wvi.org>

Dear Patrick and Leo,

I hope this email finds you well.

I am writing to inform you that I intend to conduct my research in Minakulu and Aber Sub-Counties. My focus will be on smallholder farmers who were trained under the R&L project in your area.

To support this research, I plan to work with five TOTs from your APs. **Kindly note that I will personally facilitate these TOTs from my own resources.**

Thank you.

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