ANALYSIS OF THE EFFECTIVENESS OF PARTICIPATORY VIDEO IN DISSEMINATION OF AGRICULTURAL INFORMATION AMONG SMALLHOLDER FARMERS OF BUNGOMA COUNTY, KENYA

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DECLARATION

I declare that this dissertation is my original work and has not been presented for a degree or any award in any other University. I also declare that this contains no material written or published by other people except where due reference is made and the author duly acknowledged.

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DEDICATION

I dedicate this work to my family and friends who have always been there to support me throughout the study period.

ABSTRACT

Participatory video is just one among the tools that are used for disseminating agricultural information. The use of video has been seen as catalyst to effective knowledge transfer to rural areas of the developing world. However, the use of participatory video in dissemination of agricultural information to farmers only started to take root in developing countries few years ago thus necessitating for more studies to establish its effectiveness. This study therefore endeavoured to study the farmers' perception, application and effectiveness of participatory video in dissemination of agricultural information among smallholder farmers in Kabuchai Division, Bungoma County. The study employed a descriptive survey research design to collect data from 120 smallholder farmers half of whom had been trained through participatory video and were purposively selected from an existing list of adopters and the other half were selected randomly. The data was collected using a semi-structured questionnaire. The data was analyzed using SPSS and presented using frequency tables, percentages, charts, graphs, averages, and regression model. The results of regression model showed that 17% of the study factors explained the change in the effectiveness of participatory video as a medium for dissemination of agricultural information. The study further confirmed that income of farmers, group membership, access to credit and distance to extension offices as factors affecting the effectiveness of participatory video in dissemination of information. This was evidenced through p-values of 0.02, 0.01, 0.08 and 0.027 respectively.

The findings also revealed that majority of farmers (75%) rated participatory video approach as effective while 25% rated it as not effective. The findings of the study further revealed that a great majority of farmers (83%) believed that participatory video encourages farmers to try new agricultural technologies. The study findings indicated the comparative advantage of PV over face to face interactions with extension agents lies in the following reasons; ability of PV to demonstrate (30%), storage of information for future reference mentioned (21%), ease of sharing information from one farmer to the other (16%), ease of availability (15%), larger geographical reach 12%) and ease of understanding (7%) respectively. The study concludes that participatory video is positively perceived among the farmers as an effective tool to supplement or complement the face-to-face extension. It also concludes that participatory video encourages the adoption of new agricultural technology and that participatory video use among farmers is determined by farmer's membership to a group, income levels and distance from extension officers. The study thus recommends that there is need to integrate use of participatory video to compliment and supplement the existing agricultural extension approaches to reach more farmers beyond the study area and encourage horizontal form of information sharing. Further, the study recommends that a study should be conducted to assess the cost-effectiveness of participatory video against the conventional extension approaches.

Key Words: Participatory Video, Extension, Technology Adoption

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ACRONYMS AND ABBREVIATIONS

DOI:	Diffusion of Innovation
FFS:	Farmer Field School
GDP:	Gross Domestic Product
GoK:	Government of Kenya
ICT:	Information Communication Technology
MDG:	Millennium Development Goals
PV**:**	Participatory Video
SRA:	Strategy for Revitalizing Agriculture
T&V:	Training and Visit System
WARDA:	Africa Rice Centre
ZIZO:	Zooming-in Zooming-out

CHAPTER ONE: INTRODUCTION

1.1 Background Information

Agriculture is the backbone of Kenya's economy and currently contributes 26 per cent of the Gross domestic product (GDP) directly and another 25 per cent indirectly. The sector provides more than 18 per cent of nation's formal employment and supports more than 75 per cent of the nation's population especially in the rural areas (Government of Kenya, 2010). The growth of the sector is highly correlated to the growth of the country's economy. However, the performance of the sector is far from satisfactory with the agricultural production output lagging behind those in developed countries for decades (Aker 2011). This dismal performance in the sector has been attributed to inadequate access to information among other factors thus resulting in low adoption of modern agricultural technologies (GoK 2010; Toyama et al. 2009). To this end, sustained agricultural growth is critical for improving the living standards of the rural people and in generating rapid economic growth. To achieve this, access to information on improved agricultural technologies and innovation has become pivotal especially among the resource-poor smallholder farmers (Bowonder and Yelwender, 2005).

According to (Asenso-okyere and Mekonnen, 2012), knowledge and information are the main drivers of socio-economic changes in the world yet the productivity growth achievable by smallholder farmers from accessing and utilizing information on new agricultural technologies has not been fully achieved (Alene and Manyong, 2006). This has been largely attributed to the weaknesses in agricultural extension services provision and poor infrastructure for information access by smallholder farmers (Government of Kenya, 2012). Numerous studies that have been undertaken indicate that there are a number of factors that determine the uptake and utilization of

agricultural technologies and innovations. In particular, access to information is critical in speeding up the adoption process of an innovation (Fuglie and Kascak 2001; Burton et al. 2003). Extension service is the major public provider of the agricultural information in Kenya. Various models of extension ranging from T&V to Farmer Field Schools have been established to strengthen the extension activities designed to improve agricultural production and related economic activities through the adoption of good agricultural technologies.

The declining effectiveness of the extensions service has been identified as a major factor that is hampering growth of Kenyan agriculture. The Strategy for Revitalizing Agriculture (SRA) has underscored the fact that productivity of farmers can be improved through improvement of extension and advisory delivery services (Government of Kenya 2007).

Common sources of agricultural information that have been used are the radio, television, extension, magazines, newspapers and face-to-face communication. However, most of these methods focused on the top-down approach of dissemination of information for example from research centers and extension personnel to farmers as sources and receivers respectively and as a result, low learning and adoption of agricultural innovations have been experienced (Governement of Kenya 2010).

Various studies done on the effective sources of agricultural information have shown that farmers cite fellow and neighbouring farmers as the most effective sources. However, because of the nature of farmers' livelihood, fellow farmers reach only those farmers that are close to them. Information communication technologies are believed to improve farmer to farmer communication.

In the recent past, research institutions have embraced the use of Information and Communication technologies (ICTs) (Munyua, 2007). ICTs are believed to bring about social

and economic development by creating an enabling environment and its benefits reach even those who do not themselves have first-hand access to them. The importance of ICTs in development process was long recognized and access to ICTs was even made one of the targets of the Millennium Development Goal No. 8 (MDG 8) which emphasizes the benefits of new technologies especially ICTs in the fight against poverty (World Bank, 2009). However not all ICTs have been fully exploited in the dissemination of information hence the low productivity of smallholder farms. Participatory videos are such ICTs that have not been fully exploited in accessing agricultural information. Participatory video is believed to be a cost effective ICT for farmer to farmer communication (Coldevin, 2001). Participatory video combines both visual and verbal communication methods and therefore appears to be a suitable extension tool for third world countries as medium for the transmission of information and knowledge (Vidya and Chinnaiyan 2010). It allows for the standardization of information for accurate transmission from a technical source, in situations where high quality trainers may not be available, and is suitable for low literacy populations. Besides, it integrates local's participation in the process of technology communication, dissemination and learning using video as a medium/platform through which smallholder farmers can discuss and share their numerous experiences as far as information on agricultural technologies and innovations are concerned. However, Participatory video has not been widely adopted as a tool for disseminating technical agricultural information to farmers (Gakuru, Kristen and Stepman, 2009, Ovwigho et al. 2009)). In Kenya, this slow uptake of the tool for agricultural extension has been attributed to minimal studies on its effectiveness as a communication tool in agriculture extension (Gandhi et al. 2007; Zossou, et al. 2009; Zossou et al. 2010). This study, therefore, sought to find out application and effectiveness

of Participatory Video (PV) for agricultural extension among smallholder farmers in Bungoma County.

1.2 Statement of the problem

Research evidences indicate that there is a gap between agricultural performance and available research information. Poor channels of communication between actors in extension service delivery and farmers have been shown to hinder flow of developed technologies to farming communities (Kimaro et al. 2010). Attempts to resolve this problem of poor access of productivity enhancing agricultural information and technologies by smallholder farmers have focused on promoting information transfer through ICT-based innovations (Tollens 2006 and Aker 2008). Despite the attempts to promote the application of ICT tools in dissemination of agricultural information to farmers, participatory video has not been widely adopted as a communication tool in agriculture extension. This slow uptake has been attributed to the lack of studies on farmers' perception, application, factor analysis, and its effectiveness as a communication tool.

Sarker et al., (2014), in a study that was carried out to analyse the effectiveness of participatory video in the adoption of organic farming in Bangladesh established that participatory video was effective in convincing farmers to adopt organic farming. The study focused on understanding the impact of PV on enhancing adoption of new agricultural techniques without focusing on the factors that affect the use of PVs.

Another study by Bentley et al (2014) was carried out in Mali to test the effect of PVs in triggering social innovation among participating farmers. The study findings indicated that community members and organizations changed their ways of solving problems after watching

the PVs. This study also focused on one aspect of effectiveness, encouraging innovation without understanding the factors that can enhance or inhibit the effectiveness of such PVs.

Locally, study by Ouma et al (2014) was carried to determine the effectiveness of PV in sharing Push-pull technology (PPT) knowledge to enhance sorghum production among smallholder sorghum farmers in Rachuonyo North. The results indicated that almost all PV trained farmers easily shared out information to fellow farmers and it also indicated that there exists a statistically significant positive relationship between knowledge shared and knowledge use. This study only focused on the following variable to test effectiveness: knowledge shared, ease of sharing knowledge and knowledge use. These necessitated the need for another study on other variables on effectiveness of PVs in Kenya. Thus the study focused on analysing the effectiveness of PV with an aim of understanding the factors affecting its effectiveness, perception of farmers towards PV, application of technologies disseminated through PV and its comparative advantages vis-à-vis government agricultural extension services.

1.3 Research questions and Hypothesis Testing

1.3.1 Hypothesis

H0: There are no significant factors that affect the adoption of PV as a communication tool in dissemination of agricultural information.

H1: There are no significant factors that affect the adoption of PV as a communication tool dissemination of agricultural information?

1.3.2 Research Questions

i. What are the farmers' perceptions of the use of participatory video as a medium for agricultural extension?

ii. What is the rate utilization of agricultural technologies disseminated through participatory video among smallholder farmers?

iii. What is the comparative advantage of using participatory video in dissemination of agricultural technologies vis-à-vis government extension methods?

1.4 Research objectives

1.4.1 General objective

The main objective of the study was to assess the farmers' perception, application and effectiveness of participatory video as a medium for dissemination of agricultural technologies among small scale farmers of Bungoma County.

1.4.2 Specific objectives

i. To determine the factors that influences the adoption of PV as a communication tool for dissemination of agricultural information.

ii. To assess farmer's perception of the use of PV as a tool for dissemination of agricultural technologies.

iii. To establish the application of agricultural technologies disseminated through PV among smallholder farmers.

iv. To determine comparative advantage of the use of PV as a dissemination tool vis-à-vis government extension methods.

1.5 Justification of the study

Participatory video can leverage conditions for rural farmers to communicate each other's perception, interests and to create feelings of interdependence. An important feature of PV as a

form of farmer to farmer diffusion is the ability to present a technical message from farmer perspective thereby increasing the chances of technology uptake. Participatory Video approach also increases the retention ability of the farmers in that an idea watched stick more than something taught and no demonstrations given. Agricultural videos are made directly by farmers in their local languages that can be understood by them. The content can be stored in portable media such as CD-ROMs and DVDs and viewed using a laptop computer or via the internet, screens, projectors thus bringing local experiences and knowledge into a global network, allowing all relevant actors to learn from each other. Content stored in such manner can be retrieved easily when needed hence information is accessible. Participatory video also provides a way for farmers to communicate their ideas, innovations, theories and decisions not only to each other but also to formal researchers and development agents. Wide application of PV will ultimately lead to adoption of improved agricultural technologies and innovations by small-scale farmers and hence improve farm productivity, enhance food security and thus improve farmers' livelihood. Though PV has been acknowledged to play a major role in enhancing adoption of productivity enhancing technologies, there is still dearth of information concerning the effectiveness of PV thus the need for the study.

1.6 Significance of the study

The results of the study contribute to a body of existing literature concerning adoption of ICTs and in particular PV in dissemination of agricultural information. It provides an opportunity to both levels of government to ensure access to information by smallholder farmers through integration of this cheap and attractive technology to the existing extension approaches and to exploit the capacity of local social networks in sharing information.

1.7 Scope and Limitations

The study was confined to Kabuchai Sub-County in Bungoma County as one of the high potential areas of Kenya and with a number of farmers watching agricultural videos especially on Push-Pull technology. This provided important insights on the adoption of PV as a tool for disseminating agricultural information. The parameters of interest were household socio-economic variables as they influence and determine the use of PV in accessing information by small holder farmer. The study further considered the utilization and comparative advantages of PV over conventional extension methods.

1.8 Definitions of Terms

Participatory video (PV)

According to Johansson et al. (1999) Participatory Video refers to script-less video process, produced by a group of grassroots people, moving forward in iterative cycles of shooting–reviewing. This process aims at creating a video that communicate the experiences of the participants.

Lunch & Lunch (2006) described PV as a set of techniques to involve a group or community in shaping and creating their own film. The idea behind this is that making a video is easy and accessible, and is a great way of bringing people together to explore issues, voice concerns or simply to be creative and tell stories. PV is a highly effective tool to engage and mobilize marginalized people and to help them implement their own forms of sustainable development based on local needs.

Extension services have been defined by (Toyama 2011), as the dissemination of expert agricultural knowledge and practices from research through the extension to the end users.

Smallholder farmer

Refer to farmers with limited resource endowments especially land size relative to other farmers in the agriculture sector. Smallholder farmers represent a large number of holdings in many developing countries and their numbers have increased in the last two decades.

Agricultural information

Information refers to data that has been shaped into a form that is meaningful and useful to human beings. Agricultural information therefore refers to any processed data in both tacit and explicit form which can be used to make informed decisions regarding land, labor, livestock, capital and management. When information is actualized it leads to knowledge. Knowledge refers to information that is relevant, actionable and based at least partially on experience.

Agricultural Technologies

Refers to new inputs, methods, new processes or new innovations to improve the production and productivity in agriculture

Technology transfer Refers to an activity which facilitates the transfer of research results for scientists by extension officers into agricultural knowledge and then implementation into useful farm practices, in local conditions.

Access: It is defined as the availability or potential for use at the individual, household, or community level. Access implies the right or ability to use a resource or input but is not an actual use measurement.

Adoption: It is the initial use of an input or method by an individual, household, or community that often, but not always, occurs in the context of an established program or scheme.

CHAPTER TWO: LITERATURE REVIEW

2.1 Agriculture Extension in Kenya

Agricultural extension service is charged with the responsibility of disseminating information and knowledge (Hedjazi et al. 2006) generated through research with the aim of improving the farm productivity of farmers, enhancing food security, alleviating poverty and improving livelihoods (Cunguara and Moder 2011). The extension system has evolved over time through improvements, development and adoption of more participatory approaches. One of the models for technology transfer is Training and Visit (T&V) system which was promoted by the World Bank. The system was developed to put the farmer, the resource constraints, abilities and needs at the center of the whole extension system (Semana et al. 2000). The high costs of operating the elaborate structures, combined with the lack of new technologies, however led to the abandonment of the model. Few of the T&V programs still operate today (Semana et al. 2000). The Farmer Field School (FFS) is another approach which was initially developed in Asia in the early 1990s to address a major threat to food security resulting from dramatic yield losses caused by the brown plant hopper. It is an innovative, participatory and interactive learning approach. Farmer Field School is a learner centered approach, whereby farmers through observation, experimentation and evaluation, leading to understanding, are equipped to address challenges and introduce appropriate changes in their farm management practices (Hiller et al. 2009). The field is the primary learning material, and extension workers are facilitators not teachers. Farmers are the main actors in this process and outsiders (extension agents, researchers, Non-Governmental Organizations) take a role as facilitators or resource centres.

In Kenya, a range of other extension methods have been employed in dissemination of information. These include the field days, agricultural shows, face to face extension, on-farm

demonstrations, farmer teachers, mass media (radio-Tembea na Majira and the on-going Citizen TV's aired programme - Shamba shape up), public gatherings (chief`s Barazas), printed matter, and farmer field schools (Khan et al., 2008; Amudavi et al., 2009). However, the extension system in Kenya is faced with a myriad of policy changes/challenges, including low budgetary allocation and few extension staff to suffice the information needs of all farmers.

2.2 Agricultural Information

Information and knowledge are regarded as the new 'factor of production' playing a critical role in economic development as the traditional factors of production – land, labor capital and management(World Bank 2012). Small scale farmers need information on new agricultural technologies to improve their farm productivity. This has for several decades been provided by Agricultural extension as the main source in Kenya but the system has been faced with a myriad of challenges especially due to the top down approaches that have been in use and lack of adequate resources for the field agents at the ground level. In Kenya, farmer-extension staff ratio continues to remain high particularly due to reduction of the number of extension staff through natural attrition and a freeze on hiring new staff (Ali-Olubandwa et al. 2011). This makes the extension service ineffective in reaching farmers. This state of affairs calls for application of extension methods that are cost effective and participatory in nature.

According to Olawoye (1996), information is a crucial resource required for increasing agricultural productivity of farmers. Samuel (2001) identifies agricultural information as the data for decision-making and a resource that has to be acquired and used in order to make informed decisions. Agricultural information consists of published (explicit) or unpublished (tacit) knowledge that may broadly be categorized as technical/scientific, commercial, social and

cultural and legal information (Aina et al. 1995). The decision making process by the farmer depends on the information that is available. Information facilitates the farmer to be more rational and hence improve the decision making abilities (Asres 2005). According to Asenso-okyere & Mekonnen, (2012), access to knowledge and information is essential for facilitating rural development and bringing about social and economic change. Muvezwa (2006) in fact suggested that information is now the fifth factor of production in addition to land, capital, labor, and management. As population expands and the farm family land size diminishes due to sub-division and fragmentation, it is essential to apply new methods of farming and technologies that are more effective (Gundu, 2006). Lack of agricultural information and technical knowledge is among the factors responsible for low productivity among small holder farmers (Abbas et al. 2008). Utilization of relevant, accurate and up-to-date information especially in agriculture would ensure increased productivity (Banmeke and Ajayi 2008). The farmers require a wide range of information that is related to production, policy and economic for sustainable production.

2.3 ICTs in Agriculture Extension

According to (Omotayo and Isiaka 2005) a number of issues in many developing countries are shaping the future of extension services and are setting the stage for the adoption of ICT. These issues include: the demand for effective and appropriate extension services, dwindling government budgets, advances in telecommunication technology worldwide, globalization among others.

The Importance of Information and Communication Technologies in economic growth have long been recognized and access to ICTs are made one of the targets in the Millennium development goals (MDG 8) which underscore the benefits of ICTs in fight against poverty. Asenso-okyere

and Mekonnen, (2012) highlights that the benefits of ICTs reach even those who do not have first hand access to such devices. ICTs provide the potential to increase agricultural productivity through dissemination and communication of information and knowledge to rural agricultural communities (Munyua et al. 2008). ICTs provide an opportunity for developing countries, including Kenya to harness and utilize agricultural information and knowledge to improve productivity among farmers (Lwoga et al. 2010). According to (Davison et al. 2005), ICTs can help the rural development workers in developing countries to gather, store, retrieve, adapt, localize and disseminate a broad range of information required by rural families thus causing the realization of the bottom up approach of technology generation and transfer (Meera et al. 2004). ICTs that are in use among Kenyan farmers are mobile phones, radios, TV and internet. Videos are also in use but have not been fully exploited among the small holder farmers. The promotion of ICTs in agriculture has mainly focused on its adoption and use by the extension officers. However, agriculture extension service provision is shifting towards employing participatory approaches that involve the end users of technologies in the creation and transfer of such technologies. There are, therefore, ICTs that enable horizontal communication hence allowing farmers to share information amongst them. Participatory video is one such ICT.

2.4 Origin of Participatory Videos

Review of literatures on this study, suggests that PV use started in the late 1960s by Donald Snowden, the then Director of the extension Department at Memorial University of Newfoundland. The genesis of PV can be traced to Fogo Island, a small Island out port fishing community off the Eastern coast of Newfoundland. By 1967 Fogo Island had only 5,000 people. Poverty was at its peak, with not much communication between the communities that occupied the Island. The island represented the type of isolation and lack of information or organization

that Snowden wanted to show as alternate indicators of poverty in the province. For over 300 years, the occupants of the Island fully depended on fishing as their only source of livelihood, unfortunately that wasn`t to sustain them for long. By this time, inshore fishing had been dropping thus poverty rates were escalating.

Then Snowden and other scientist decided that for the Islanders to survive there is need to form co-operatives that will be used to bring people together so that they share their problems and protect their cultures. Snowden and his colleagues through the consultation of the communities, therefore, introduced the use of film so that people can be able to tell their stories and also share their problems with others. The film was introduced so that the people could know that they share common problems and therefore, jointly, they should develop solutions to the problems (Singhal, 2003). Low decided to show the films to the people of Fogo and thirty-five separate screenings were held with the total number of viewers reaching 3,000. This became an important part of the process. It was realized that people were not comfortable discussing issues with each other face to face. However, they were quite comfortable telling their views on camera which was then taken to other community to watch. After watching the films, the islanders started to appreciate that all the communities were experiencing the same problems; they became more aware of these problems and what needed to be done to solve them. Since then the use of participatory video expanded to various regions and now it has been applied in various projects around the globe.

PV has been used in different parts of the world for such varied purposes as community development, training and education, therapy, community organization and mobilization, political and social activism, advocacy, cultural preservation, mediation and conflicts resolution,

lending voice to the voiceless empowering women behind cameras and for use among illiterate communities among others,(White 2003).

In 1970s, Food and Agriculture Organization (FAO) begun using video to recover, preserve and produce farmers' knowledge in Peru and Mexico (Fraser, 1987; Fraser and Estrada, 1996). However, the organization was criticized for using a sophisticated technology in a rural setting (Ramírez 1998). Nevertheless, Harding 1997 through his studies found out that video tool could be used as a cost-effective tool to enhance group development and therefore, (PV) has now been used for engaging stakeholders, facilitating development and sharing knowledge (Lunch, 2004). Compared to other media, videos became very affordable and they have a comparative advantage because pictures stick better in the mind and they are available for a wide range of people (Khadar and Ndiaye 2003).

Participatory video uses both visual and verbal communication methods thus appears to be an appropriate extension tool for less developed countries as this medium is suited for the transmission of skills, information and knowledge (Vidya and Chinnaiyan 2010). Video has been used as t tool to produce information with farmers and disseminate that knowledge to similar people. Knowledge and access to information are essential for people to respond successfully to the opportunities and challenges of social, economic and technological changes, including those that help to improve agricultural productivity, food security and rural livelihoods.

WARDA developed an approach called zooming-in zooming-out (ZIZO) which shows organizations how to produce low cost, high quality videos that are locally appropriate and regionally relevant (Van Mele 2006). In Ghana, PV was used as a tool to empower innovative farmers to share their innovations to others. From their study, an important characteristic of PV

identified as a form of farmer to farmer diffusion is the presentation of technical messages from a another farmer encouraging innovation and trust, (Zossou et al., 2009) thus increasing chances of uptake.

2.4.1 Participatory Video in agricultural extension

Finding understandings in the use of PV in agricultural extension in developing countries has been hindered by lack of documentation and impact studies (Van Mele, 2011). The rapidly increasing information and communication technology (ICT) projects over the past years have been followed by remarkable string of studies on their impact and effectiveness. Participatory Video, however, is hardly featured in any of those studies. Cheap digital technology and an increasing appreciation that visual support tools are needed to enhance impact have triggered the interest in video for rural development. This coincides with an emerging understanding that ICT technologies are only as useful as the content they carry and the intent and skills of the people using them (Toyama, 2010).

Examples of the application of Participatory Video range from elders using it in Philippines to record and archive the indigenous knowledge (IK), women's collectives in India using it to lobby decision makers and Oxfam video team using it to mediate between parents and teachers in Vietnam, documentation of pastoralists (Maasai) opinions on forest conservation plan in Tanzania (Taylor and Johansson 1996; Okahashi 2000).

2.4.2 Participatory Video in Technology Communication

Video is a tool that enhances participation in communication as well creating a final product that can be watched by other people who understand the language of the video, McCausland (2006). The advantages of using participatory video have been felt for decades. The late Martha Stuart

was one of the pioneer researchers in the areas of participatory video, with a special focus on how participatory video can be used as a tool for social change and, in several other respects. She recognized the development potential of small video formats due to its flexibility and portability compared to other traditional media (Singhal et al, 2008). With latest revolutions witnessed in video and computer technologies, different video formats have been developed that caters for the different technology platforms and output mediums being used. The recorded participatory videos can then be transported to other communities for watching.

Use of PV has been found to be relatively cheaper and effective in dissemination and communication of agricultural technologies compared to other conventional extension methods. The proponents of participatory video say that its overall costs is cheaper because; first, the costs of video cameras, computers and Television sets have significantly reduced, making it affordable and accessible to many people including farmers. In addition, video being portable makes it easily transferable from one location to another thus enhancing wide dissemination of the agricultural technologies (Toyoma 2011). On the other hand, despite its extensive use, print materials have been criticized for not being efficient in dissemination of agricultural technologies. This is because it doesn't favor majority of the rural farmers who are either semi-literate or completely illiterate since farmers find it difficult to read and understand the technical intensive knowledge on such technologies, thus applying it also becomes a big problem to them. When farmers express themselves through the media, in the case of participatory video, it makes the participants more critical and they realize that they have a place in the society, that they are citizens, and that they can be heard.

2.5 Theoretical framework

The study is based on two theories: Diffusion of Innovation (DoI) theory and Information Richness theory

2.5.1 Diffusion of Innovation (DoI)

The theory explains the process by which a new idea or practice is communicated through certain channels over time among members of a social system. It describes that different people adopt or reject an innovation depending on various factors as the relative advantage, complexity of the innovation, trialability, observability and time. The theory explains that some people in the society will accept an innovation or technology while others do not. This is majorly because the fraction adopting an innovation is approximately normally distributed and more often they are found in social groupings (Rogers, 1995). Diffusion is a special type of communication in which a new idea or new product is accepted by the market.

According to this theory the process of diffusion takes an S-shaped curve since some innovations have slower rates of adoption than others. Everret Rogers in his study of diffusion of hybrid seeds found out that farmers adopt agricultural innovations and technologies at different times and this prompted him to categorize farmers in five groups which include: Innovators, early adopters, early majority, late majority and laggards. A key component of the diffusion of innovation theory is referencing. That is, people are persuaded to adopt technology by talking to others in their industry who are already using it. They listen to their opinions and, through a process Rogers calls 'modelling and imitation', may adopt the innovation. Referencing happens through a variety of ways, including participatory videos depending on the participants in the video, and to what degree other farmers can associate themselves with farmers showcasing the technology through the videos. The theory will thus be applicable to the study in that it enabled

the researcher to test the degree to which participatory video helped in reinforcing the shared technologies/practices thus encouraging farmers to move from being early adopters to full adopters of the technologies.

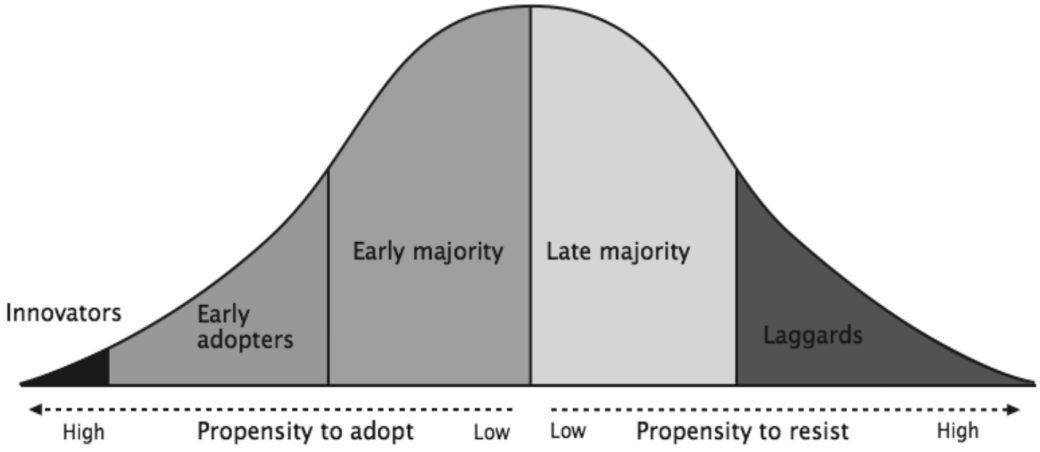

Figure 2. 1: Adoption of Innovations groups

Source: Adapted from Moore, (1999)

2.5.2 Information Richness Theory

Information Richness theory was developed by Daft and Lengel in 1984. This theory explains that the medium of communication determines the richness of information processed. Information richness refers to the potential information-carrying capacity of data. The main reason why agricultural practitioners are constantly searching for information is to increase yields and obtain better economic returns and such information is accessed through proper channels of communication. A lot of agricultural information on new productivity enhancing agricultural technologies/innovations has been produced but there is little utilization of such

information on the part of the farmers. Adoption and utilization of new technologies therefore largely depends on the channel/medium of communication used. Participatory Video is thought of as an effective medium in that it is believed that "seeing is believing" and therefore majority of farmers that fall in the two large categories in the above diagram of adoption will be influenced to adopt and utilize the technologies in time hence improving their farm productivity and as a result their livelihoods. According to information richness theory there are four factors that are central to any media information richness. These factors include: Ability to transmit to multiple cues, immediacy of feedback, language variety of the media and personal focus of the medium. The use of information theory in the study was thus applied in testing the degree to which participatory video was able to transmit multiple cues which is a key measure on the effectiveness of participatory video as a dissemination tool. This is because participatory video offers both audio and visual. Additionally the theory allowed for effectiveness to be carried out on the use of participatory video.

2.6 Conceptual Framework

The conceptual frame work presents the interrelationships in the study, the key variables involved and how they are interrelated. To enhance increased yield of small holder farmers, access to accurate, timely and relevant agricultural information is paramount. According (McBride & Daberkow 2003), access to information influences the adoption of technologies. Therefore to enhance the production, one of the options would be to increase farmers' access to and use of good information on agricultural technologies and innovations. This conceptual framework is based on the assumption that farmer's perception and socio-economic demographics influence the choice of the channel of dissemination of information and that adoption of agricultural technologies largely depend on the source of information used.

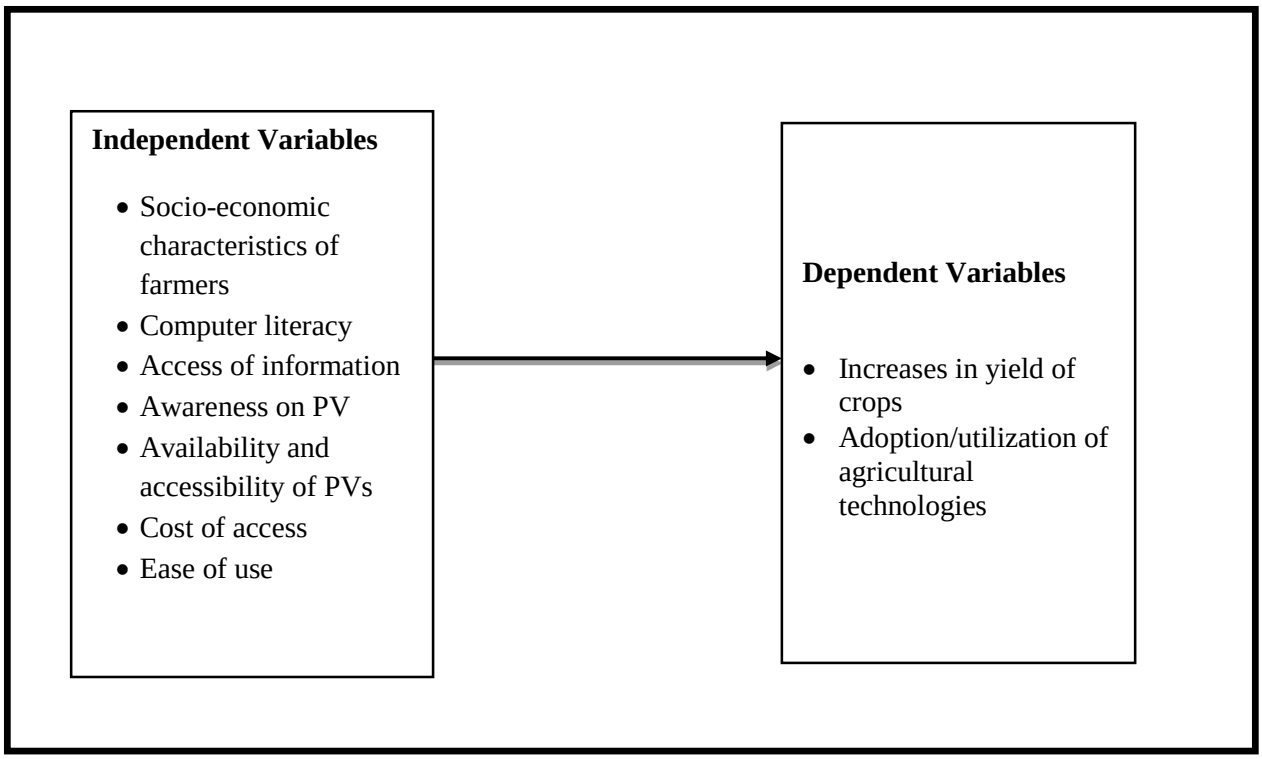

Figure 2. 2: Conceptual Framework

CHAPTER THREE: MATERIALS AND METHODS

3.1 Research design

The descriptive survey study employed both qualitative and quantitative techniques to investigate the application of participatory video in dissemination of agricultural information among smallholder farmers of Bungoma County. The design was chosen since the study intended to provide information on the prevailing situation on the use of PV in the mentioned areas to promote agriculture and how effective it is compared to other sources of information.

3.2 Area of study

The study was conducted in Kabuchai Division in Kabuchai constituency located in Western Kenya, Bungoma County. Bungoma County is along the Kenya-Uganda border and borders Busia, Kakamega and Tranzoia Counties. Kabuchai Constituency has four county ward assemblies namely; Mukuyuni, Bwake, West Nalando, and Kabuchai/Chwele ward. Bungoma County falls under the Agro-Ecological Zone (AEZ) II classified as Sub-humid. The County has an altitude ranging from over 2000 metres above sea level in the North to 1200 metres in the lower lying South and South West (Ralph et al., 2005). The County has a tropical climate with mean annual temperature ranging from 15ºC to 20ºC to a maximum of between 22^0c to 30^0c and experiences bimodal rainfall with an average of 1200mmm to 1800mm per annum.

The County also has an abundant and well distributed annual average rainfall with average precipitation ranging from 1250 mm to 1800 mm per annum. It has two rainy seasons where the long rains runs from March to July while the short rains start in August to October. The County is also characterized with have good soils of varying soil properties, with inherently fertile deep rich Andosols and Nitisols towards the slopes of Mt. Elgon. The western part of the County has

Acrisols, while the centre of the County is predominantly Feralsols. The eastern part of the district comprises Acrisols and Feralsols. Continuous cropping systems among farmers in the County with minimum addition of quality input have seen the fertility of the soils reduce. The availability of major nutrients N, and P is low in the districts. (Ralph et al., 2005)

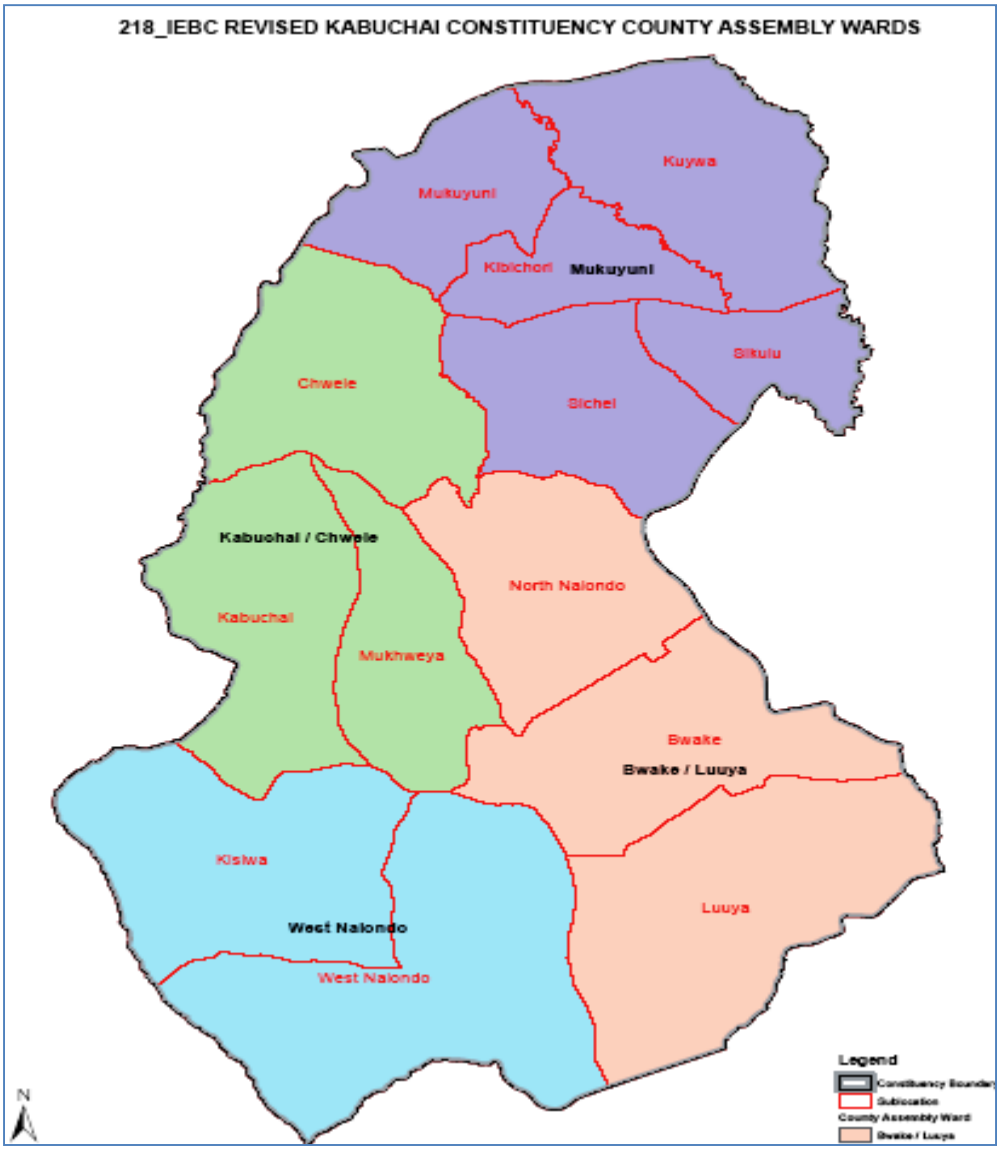

Figure 3. 1: Kabuchai Constituency Map

Source: IEBC 2012

3.3 Target population

The target population of the study was the smallholder farmers of Kabuchai Division in Bungoma County. The farmers in the area are small scale practicing mixed farming with Sugar cane and maize as the major crops. They also produce Sweet potatoes, common beans, sorghum, Vegetables, Millet and finger millet. Indigenous cattle, goat, and poultry are also kept.

3.4 Sampling procedure

Kabuchai Division was purposively selected because a number of farmers are watching agricultural videos to access agricultural information in the Division. A group of farmers were trained on Push-Pull Technology (PPT) for controlling Striga weed in maize farms by ICIPE group in 2012 using videos. Besides, majority of the farmers are small scale with small portions of land where they practice mixed farming and experience same agricultural productivity problems. The division therefore gave a typical situation of smallholder production in Kenya.

The sample size was determined using the formula below recommended by Fisher and colleagues as cited in (Mugenda & Mugenda 1999):

$$n = \frac{pqz^2}{E^2}$$

Where: n is the desired sample size, Z is the standard normal deviate at the chosen confidence level a value of 1.96, p is the proportion of the population with a desired characteristic being considered, q is 1-p and E is allowable error which is 0.09 (Mugenda & Mugenda 1999).

$$n = \frac{0.5*0.5*1.96^2}{0.09^2} = 118 \approx 120$$

This resulted to a sample size of 120 respondents. Because the study was interested in both users and non-users of PV, the sample size was divided into two to yield a sample of 60 users and 60

non-users. The adopters were selected from an existing list of farmers trained using PV obtained from the Chairman of FFS. The other half of the respondents were selected randomly.

3.5 Data Collection Methods

Data were collected from the respondents through face-to-face interviews using a semi-structured and pre-tested questionnaire. A semi-structured questionnaire was used to collect primary quantitative data in the selected households through a household survey. The data covered the demographic characteristics of respondents; perception of farmers on PV utilization of PV and comparative advantages of PV over other extension methods of disseminating agricultural information.

3.6 Data Processing and Analysis

3.6.1 Descriptive Analysis

Data from the field were edited, coded, entered into a computer using the Statistical Packages for Social Sciences and cleaned to ensure accuracy, consistency, uniformity and completeness. Descriptive analysis was done to test for association between variables, correlation analysis used to determine direction of the relationships. Data were presented using graphs, tables of frequencies, pie-charts and percentages.

3.6.2 Empirical analysis

Logit Model: The study used Logit regression model to analyze and estimate the influence of independent variables (factors that influence the watching of PV) on the dependent variable (adoption of PV). The awareness/use of PV by farmers can be measured as a dichotomous variable that assumes a value of 1 if farmer is aware (uses) PV and otherwise 0. The users of PV are those farmers who are aware and have at least watched an agricultural video and adopted an

agricultural technology or innovation learnt through the video (PV). The non-users are those farmers who are not aware of the use of PV as means of disseminating and acquiring agricultural information.

Following (Maddala 2000), the probability P, that a farmer is aware (uses) PV is given by:

Prob $(Y_1=1)=e^{X'_i}\beta/ (1+e^{X'_i}\beta$

The above equation can be written as

Log [prob (event)/ prob (no-)event]= $\beta_o + \beta_1 X_1 +\ldots\ldots\ldots\ldots \beta_\kappa X_k + \varepsilon$

Where β is estimated coefficients, X is a row of independent (explanatory) variables such as farmer (family size (number), age of the household head (year), education of the household head, farming experience, farm size, land tenure system and other socioeconomic variables (access to extension service, farm income) and ε is the natural logarithm.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

The chapter presents the findings according to the objectives of the study.

4.2 Demographic characteristics of smallholder farmers of Kabuchai Division

In order to identify the characteristics of the farmers and their activities in Kabuchai Division, a comparison of PV users and non-users was made.

4.2.1 Farmer characteristics

Data was collected from 120 respondents, 60 being adopters of PV and the other 60 were non-adopters. The results of demographic characteristics including gender of the household head, education level, income source, group membership and access to credit among others were presented in the tables below. The results indicated that 88% of all the households interviewed were male-headed while 12% were female headed (Table 4.1). Among the users of PV, 46% were male-headed households while 4% were users and on the hand 43% of non-users were male-headed households while 8% female headed households. The results of Chi square test at 95% showed that gender is statistically insignificant indicating that the users and non-users had equal distribution (Appendix II). This is contrary to a study by (Cai 2013) that indicate a significant difference in the percentage of men and women who were adopters in the PV and non PV adopter, with the percentage of men being much lower (13%) in the video only group than in the non PV group. The higher percentage of men headed households in the region implies that that since men are the owners of the land, they were also decision makers in the district. Males' control of all household activities includes deciding what food to grow, what soil technologies to adopt and how to access the information.

Majority of the farmers were able to access education. The results showed that 1% (1 farmer) of PV users did not have any level of education, while 19% had primary school education, 19% had secondary school level of education while 10% and 1% had tertiary and university level of education respectively. Among the non-users of PV 1% attended adult education classes, while 18% had primary school level of education, 23% had secondary education, 8% tertiary education and 1% had university education (Table 4.1). Results of chi square showed that education (in years) was statistically insignificant indicating that users and non-users of PV had equal distribution in terms education level (Appendix II). This is unlike a study by (Cai 2013) that established there is significant difference between PV adopter and non PV adopters with the *post hoc* test indicating that non-PV adopters had significantly higher education than those of the PV adopters group. The high literacy level among the farmers implies that since majority of the household had at least primary education level, then farmers' ability to obtain, process and analyze information disseminated by participatory video is enhanced. This has the effect of helping farmers to analyze the information communicated through PV and hence they are able to make appropriate decision in regards to adoption of a technology. This is confirmed by Katungi (2006) in a study who revealed that educated farmers had more access to information than uneducated farmers.

In terms of membership to farmer groups 48% of users belonged to a farmer group while 3% were not in any farmer group. Among the non-users 37.5% were in farmer group while 13% did not belong to a farmer group (Table 4.1). Results of chi square showed that group membership was statistically significant at 5% level of significance indicating that more users were in a farmer group than the non-users. These findings are similar to the findings of (Harris 2009)

which found out that most of the users in his study were women in groups than women who were not in any existing women groups.

The results further revealed that majority of farmers do not have access to credit in that 54% of all respondents did not have access while 46% admitted that they had access to credit. The chi square results showed that access to credit is statistically insignificant indicating that there is an equal distribution of farmers in terms of access to credit (Table 4.1).

Table 4. 1: **Socio-economic characteristics of the Household heads**

Characteristic		Non-PV user	PV-user	Total
Gender	Female	15%	8%	12%
	Male	85%	92%	88%
Education of HH	University	2%	2%	2%
	Tertiary College	15%	20%	18%
	Secondary	45%	38%	42%
	Primary	37%	38%	38%
	None	0%	2%	1%
	Adult education	2%	0%	1%
Group membership	Yes	75%	95%	85%
Access to credit	Yes	52%	40%	46%
Source of income	Other sources	53%	38%	46%
	Farming	47%	62%	54%

In terms of sources of income, the results indicated that both categories of farmers were dominated by purely farmers. Among the users 31% depended on pure farming for income, while 19% depended on farming with others sources (i.e. they had two or more sources of income). Among the non-users of PV 23% obtained their income from farming only while 27% depended on farming plus others sources of income (Table 4.1). Results of chi square showed that source of income was statistically significant indicating that as the number of sources increased farmers tends to watch agricultural videos (Table 4.1).

The mean age of the users was 48.2 while for non-users was 49.6. The overall average age of farmers was 48.9 (Table 4.2). Age of the household head plays a key role in the making of farm decisions. The mean age of non-users was slightly higher than that of the users but the results of the two-tailed test showed that age was statistically insignificant indicating that users and non-users of PV had almost the same number of years in terms of age. Majority of the respondents (52%) were in the age range of 40-60 years old while the remaining 20-40 years and above 60 years constituted 30% and 18% respectively. This implies that, majority of the farmers are energetic and therefore are able to invest on new technologies adopted. According to Mathews and Onweremadu, (2007), older farmers still hold tenaciously to traditional belief and practices thus have a lesser likelihood to access, accept and adopt new technologies.

The average farming experience in years for the users of PV was 18.7 years while that for non-users was 18.9 years (Table 4.2). However, the chi square results indicated that farming experience is statistically insignificant showing that users and non-users were equally distributed in terms of experience of farming (Appendix II). Farming experience of the of the household head plays key role in determining decision of farming including search of information and the method of dissemination.

Table 4. 2: Farmers socio-economic characteristics

Characteristic	Means		
	PV users	Non-PV users	Overall mean
Age (years)	48.2	49.6	48.9
Size of household (Numbers)	6.95	7.3	7.1
Experience (years)	18.7	18.9	18.8
Land size (acres)	2.7	2.7	2.7
Distance to extension offices (km)	2.3	1.7	2

The results of land sizes owned by farmers are shown in the table 2 above. The mean size of land for the farmers was 2.7 acres (Table 4.2). The smallest farm size was 0.25 acres while the largest was 20 acres. However majority of the farmers owns small pieces of land as revealed by the study. This agrees with GoK (2009) which stated that the average small scale farms in Kenya are 0.2 to 3 acres. Farm size plays a crucial role in influencing farmers search for information and adoption of agricultural technologies. As will later be discussed in this chapter, some farmers cited that small sizes of land contribute to their (farmers) failure of adopting new agricultural technologies. Farmers who own large pieces of land can spread the risk of technology by allocating only a portion of land to try certain agricultural technologies an option not available to farmers with small sizes of land. These therefore tend to be aggressive in search of information on best technologies to try. Majority of the respondents lived 2 km away from the extension offices. The mean distance for the PV users was 2.3 km while for non-users was 1.7 km (Table 4.2). Distance to extension office is a parameter that influences the search of information by farmers.

4.3 Factors influencing farmers' use of Participatory videos

Socio-economic characteristics of the farmers such as age, gender, income levels, land size, farming experience and education influence the adoption ICTs in dissemination of agricultural technologies (Hudson and Hite 2003). Those characteristics were introduced into a binary logit model to determine their influence on adoption of PV in dissemination of agricultural information. The results of the regression analysis were as shown in Table 4.3 below.

Source of income significantly and positively influenced the use of PV by farmers at 5%. The logistic regression results revealed an increase in the unit of the sources of income (farm + off-farm income) increases the awareness and adoption of PV by 24% (Table 4.3). This suggests that

an increase in sources of income increases the farmer's disposable income hence can be able to purchase the PV kits. This is consistent with the findings of Dutta, (2009); Sabo, (2007) that wealthier farmers are likely to have more motivation to continue to seek for and access relevant and timely information using various sources so as to meet their information needs.

Table 4. 3: Results of Logistic regression on factors that influence adoption of PV

Variable	dx/dy	Coef.	Std. error	z	p>|z
Age (age_hhh)	-.0069	-.0275	.0247	-1.11	0.2660
Level of education (level_edu)	.0505	.2021	.4393	-0.46	0.6450
Household size (household_members)	.0044	-.0173	.0817	-0.21	0.8310
Farming experience (years_farming)	.0050	.0200	.0225	0.89	0.3750
Source of income (income_source)	.2470	1.010	.4451	2.37	0.0180**
Group membership (grp_mbshp)	.4811	2.484	.7583	5.39	0.0000*
TV ownership	.0748	.2992	.4283	0.70	0.485
Access to credit (access_credit)	-.1924	-.7798	.4612	-1.73	0.0830***
Source of power (power_source)	.0243	.0971	.4506	0.22	0.8290
Farm size (size of land)	.0233	.0933	.0863	1.08	0.2800
Distance to extension offices (dist_extn office)	.1360	.5438	.2010	2.70	0.0070*
Log Likelihood = -68.88913					
Pseudo R^2 = 0.1718					
Prob >chi2 = 0.0026					
LR chi2 = 28.58					

*indicates significance at 1%, ** significance at 5% and***significance at 10% dy/dx is for discrete change of dummy variable from 0 to 1

Membership to a farmer group also significantly and positively influenced the farmers' ability to watch agricultural videos at 1% level for significance. As the farmers tends to join a farmer group the probability of watching agricultural videos increased by 48%. This is because

belonging to a farmer group build the social capital and empowers farmers through collective action. The results confirm the importance of farmers' social networks in dissemination and sharing of knowledge and information (Guèye, 2009). Farmers observe and learn from others in their network of good agricultural technologies. It is believed that 'seeing is believing' and therefore when farmers watch members of the networks practice a new innovation they are convinced hence tend to adopt easily.

Proximity to agricultural extension offices also significantly and positively influenced farmers' ability to watch agricultural videos at 1%. As the distance to the extension offices increased farmers tend to look for alternative sources of information. This is evident from Table 4.3 above whereby as the distance increases the farmers' probability to use PV increased by 0.5417%. Farmers living closer to extension offices can have regular contacts with the extension officers while those living away tend to seek other sources of information to meet their information needs. Contrary to other studies, access to credit significantly and negatively influenced farmers' access to and ability to watch agricultural videos. The findings may suggest that sources other than credit are equally important as financing sources.

4.4 Farmer's Perception of the Use of Participatory Video as a Tool for Dissemination of Agricultural Technologies

As shown in *Table 4.4*, almost all the farmers in the Division were aware of ICTs used in agriculture as mentioned by 95%. Only 5% had no idea of any ICTs used in dissemination of agriculture. Awareness is the initial stage for any adoption process (Ani, 2007). This study also revealed that the farmers are aware on the use of ICT in dissemination of agricultural technology thus confirming that ICT awareness can lead to the adoption of other communication channels

such as PV as indicated leading to increase agricultural transformation as demonstrated by (Egwu and Igwe, 2013).

Table 4. 4: Awareness and use of ICTs among farmers

ICTs	Users (PV)		Non-users (PV)		Overall (out of 120)	
	N	%	N	%	N	%
Awareness	60	100%	54	90%	114	95%
Radio	49	82%	46	77%	95	79%
TV	24	40%	19	32%	43	36%
Internet	2	3%	5	8%	7	6%
Mobile phones	27	45%	11	18%	38	31%

The findings of the study showed that majority (PV users at 100% and non-PV Users at 90%) of the farmers used the various ICTs that they were aware of, with farmers being aware of mainly TV, Radio and Mobile phone as shown in *Table 4.4*. However, the findings indicate that PV adopters used more of mobile phones than TV. This is unlike the PV non adopters who used more TV than mobile phones. The findings of the study testify that farmers are aware of different ICTs methods, and by extension the methods used for participatory video. A study by (Gelb et al. 2009), found out that adoption of ICTs as a technological innovation dramatically improved the transfer and management of information in agriculture sector. This corroborates with a study that was done by (Gillwald et al. 2010) which shows that despite the penetration of emerging ICTs the more traditional ones remain popular particularly in rural areas. Ovwigho et al. (2009) showed that radio was the most important ICT used in agricultural extension delivery in Kenya followed by television and video. The radio was highly prevalent among farmers as shown by cumulative 95 (79%). This confirms a study conducted by (Adolwa et al. 2012) in western

Kenya which found that radio was the most accessible, informative and reliable channels of information dissemination.

Table 4. 5: Respondents perceptions on the effectiveness of ICTs used in dissemination of agricultural information

ICTs	Fairly Effective		Effective		Very Effective	
	Users	Non-users	Users	Non-users	Users	Non-users
Radio	7%	8%	23%	35%	16%	5%
TV	14%	9%	35%	23%	7%	2%
Internet	0%	0%	29%	57%	0%	14%
Mobile phones	3%	8%	21%	0%	47%	21%

All respondents acknowledged that ICTs were effective sources of agricultural information. Radio was rated fairly effective by 16% of the users of radio, 57% rated it as effective while 21.1% of the respondents said that it was very effective (Table 4.5). Concerning the effectiveness of TV as a source of information 23% rated it as fairly effective, while 58% rated TV as effective and 9% found it very effective. Internet was rated effective by 86% of those who uses it while 14% found it very effective. The results further revealed that 11% rated mobile phones as fairly effective, while 21% rated it effective and 69% rated mobile phones as very effective sources of information (Table 4.5).

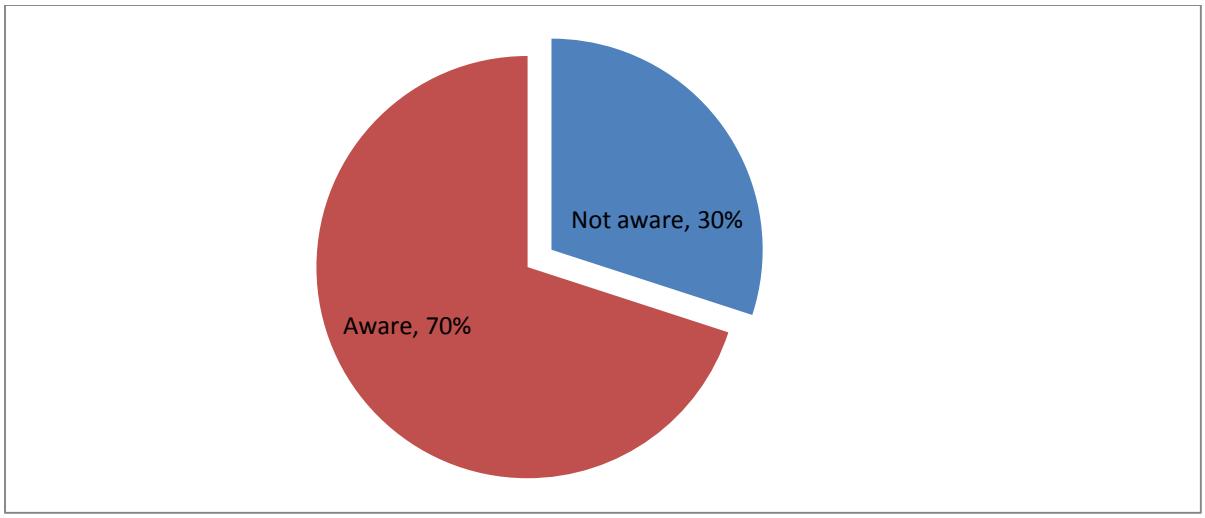

Figure 4. 1:Awareness of PV among farmers

The study revealed that 70% of the farmers were aware of the use of PV in dissemination of agricultural information, while 30% had not heard of PV as shown in *Fig. 4.1* above. As previously noted, awareness is the first stage of adoption of any technology. This augurs well with the findings of (Koech, 2014) who established that farmers are aware on the use of PV as dissemination tool for agriculture information albeit to a small degree.

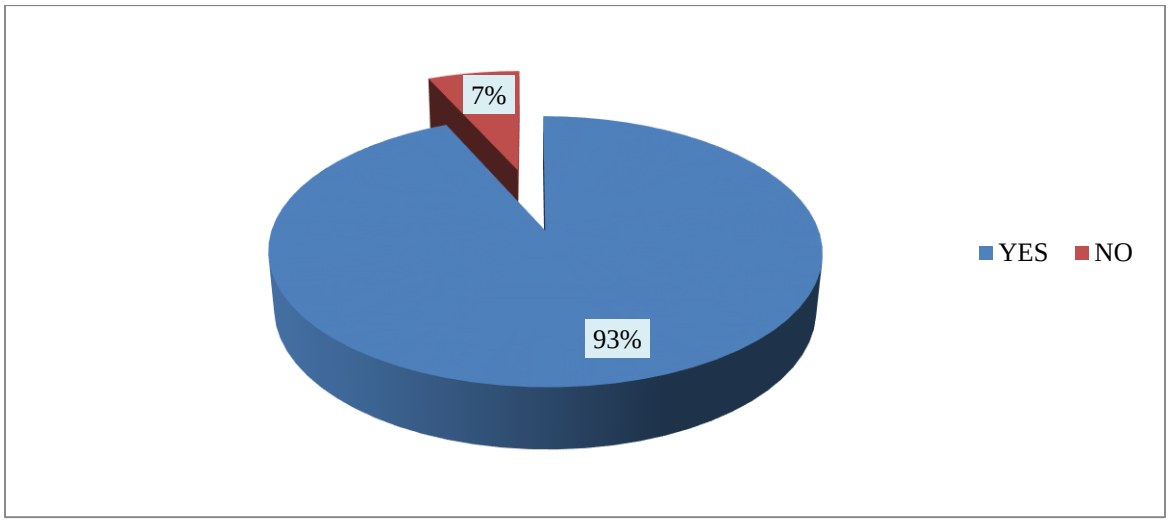

Figure 4. 2: PV addressing information needs

Majority of the respondents, 93% believed that PV addresses information needs while only 7% said that their information needs are not addressed by PV. This finding serves to show that farmers esteem PV as addressing their information needs.

Sources of information for PV awareness

As shown in *Fig. 4.3* below both farmers' field schools and farmer groups were identified by 23% of the respondents as the places where PV was learnt. These were followed by 13% of respondents learnt from fellow farmers while 7% learnt from relatives. Those who learnt about PV on field days and seminars were 3% and 3% respectively. The results are consistent with a previous study by Place et al., (2005), that fellow farmers are personal dissemination channels of agricultural information in that experienced farmers become the best discussion partners for other farmers. Together, they assess the worthiness of technologies and suitability to their farming conditions (Minja *et al.*, 2004). Integration of PV in extension which enhances horizontal communication will boost the farmers' efforts in sharing information amongst them.

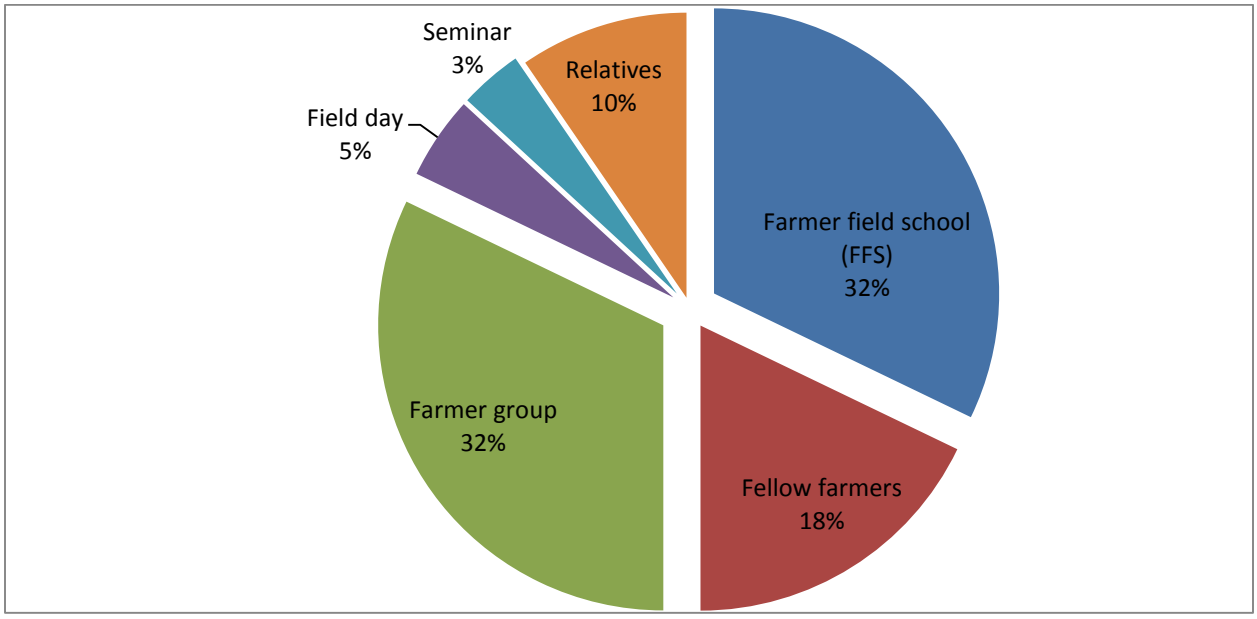

Figure 4. 3: Sources of information for PV

The findings of the study demonstrated that 40% of the farmers perceived PV to be more accessible, with 27% stating that PV was quite accessible and 8% of the respondents were neutral, i.e. no idea whether they can access PV or not. The remaining 15% said that their chances of accessing PV are very unlikely.

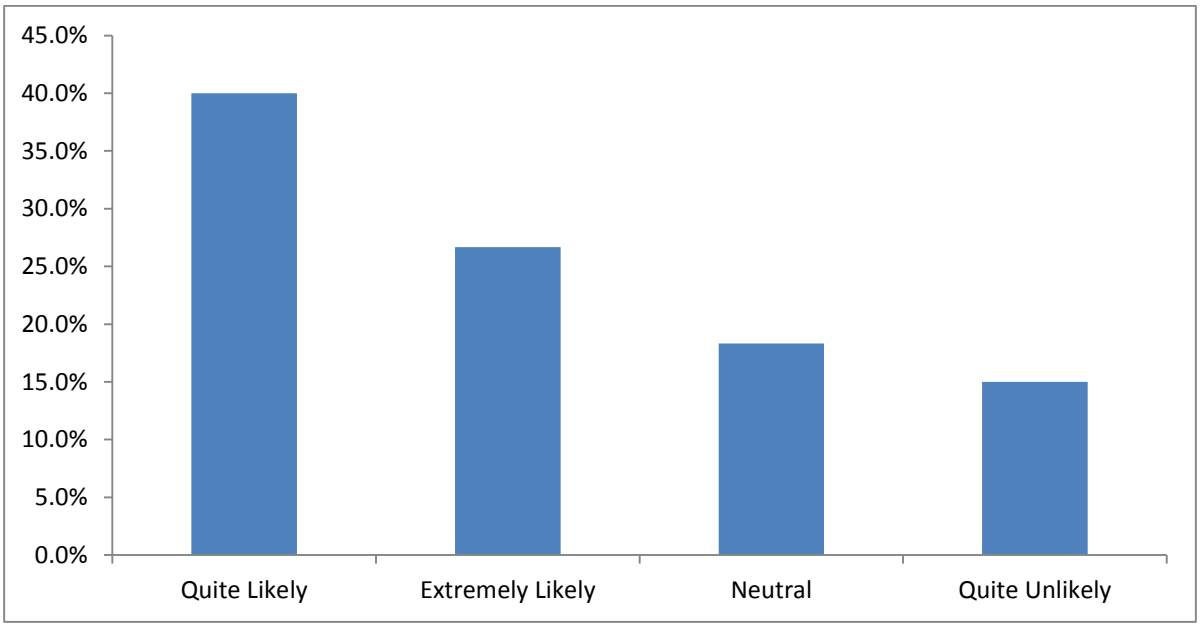

Figure 4. 4: Accessibility of PV by farmers

4.6 Application of PV in dissemination of information

As indicated in *Fig 4.5* below, in terms of coverage 52% of the PV users found PV to be very effective tool, while 23% found PV to be fairly effective and effective. This implies that video can be used to alleviate the problem of low extension agent-farmer ration. In regards to how easy it is to understand PV messages all the PV users found it to be effective as 62% said it is very effective, 30% effective and 8% found it slightly effective. In terms of frequency of access of PVs 38% found PV to be slightly effective, while 23% stated that it is effective and 33% stated it as very effective. Only 5% found it not effective.

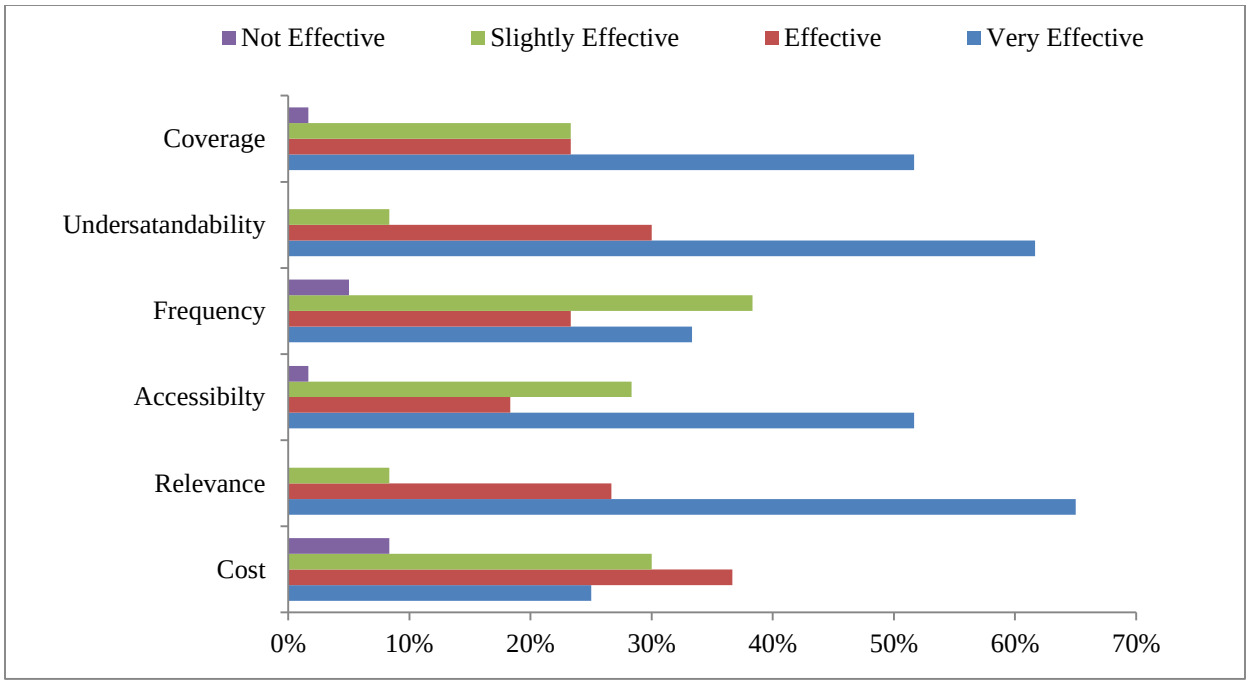

Figure 4. 5: Farmers' perceptions on the effectiveness of PV

In terms of accessibility of information through PV 52% found it to be very effective, 18% said it is effective while 28% stated it is slightly effective and 2% of users found it not effective *Fig. 4.5*. Markedly, all the respondents found PV effective in terms of relevance of information that is disseminated through PV. With regards to cost of accessing information 25% found PV very effective, while 38% found it effective, 30% said it is slightly effective and 8% said it is not effective at all. The findings of the study show that the farmers perceive PV to be majorly effective in dissemination of information due to the following characteristics: coverage, understandability, accessibility and relevance. The findings of the study also corroborate with findings of a study in Ghana which established that farmers have positive perception in regard to PV effectiveness. However the findings of the study by (David and Asamoah 2011) found out that positive perception of PV in Ghana had to do with: learning much within short time, quality of the videos and sense of ownership.

4.7 Adoption and Application of agricultural technologies disseminated through participatory video among smallholder farmers

4.7.1 Constraints to adoption of agricultural Technologies

The study sought to find the challenges that affect farmers' adoption of agricultural technologies. The challenges ranged from lack of capital as cited by majority of the respondents (76%) which is one of the factors of production. Availability of capital may reduce the risk aversion attitudes of the farmers. This was followed by untimely and unreliable information as stated by 8% of the respondents. Farmers require up to date and relevant information to use in their farm decisions. The other 7% of the respondents said that lack of the demonstrations was a hindrance to implementation, while 6% mentioned that the information received when applied does not produce the intended outcome. A key determinant of adoption of agricultural technology is the profitability of the agricultural enterprise (Kijima et al. 2011). The remaining 2% mentioned climate change as the main challenge of application of the information.

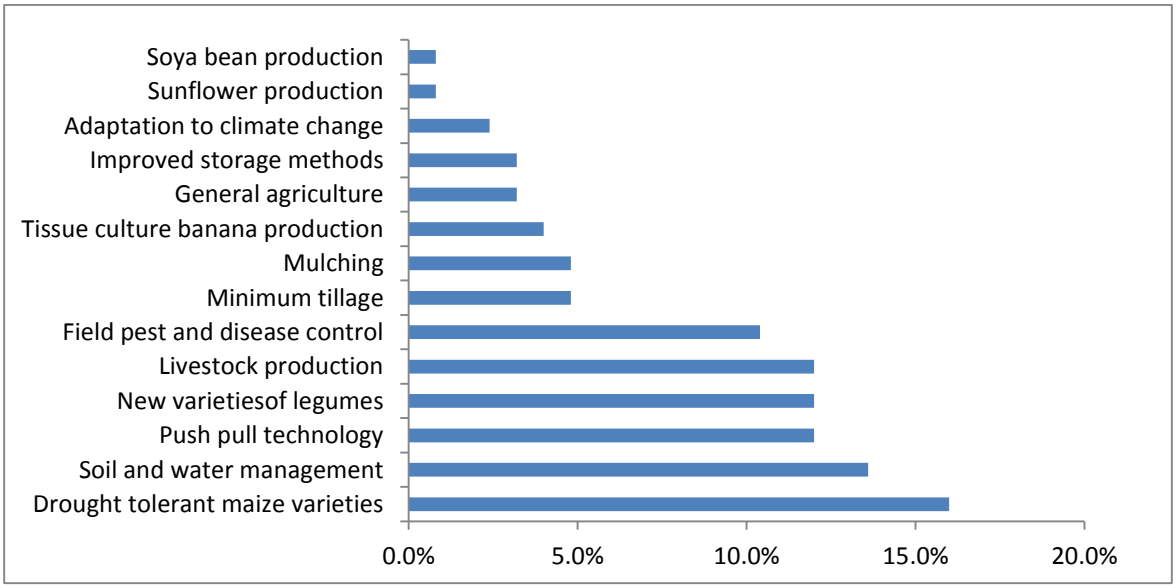

Figure 4. 6: Technologies that have been disseminated through PV

Study findings as shown in *Fig. 4.6* above indicated that various technologies have been disseminated through PV. These technologies ranged from drought tolerant maize variety as cited by 16% of PV users, this was followed by 14% of the respondents who learnt about soil and water management. Push-pull technology, new varieties of legumes and livestock production were each cited by 12% of the respondents respectively. Field pest and disease control and minimum tillage were at 10% and 5% respectively. Other technologies like mulching, tissue culture banana production, improved crop storage methods, adaptation to climate change, general agriculture, sunflower production and soya bean production were at 5%, 4%, 3%, 2%, 3%, 1% and 1% respectively.

Adoption of agricultural technologies learnt through PV was seen to be very high among respondents as 83% acknowledged that they had adopted technologies they learnt through PV. The remaining 17% did not adopt any agricultural technology. This is indicated in *Fig 4.7* below. Most of those who had not adopted claimed that they were in the process of adoption while others cited small sizes of land being a hindrance to adoption of the technologies. On the other hand (37%) of the respondents who adopted were motivated by the interesting, practical and new technologies they watched. The other 35% were motivated by the need to improve farm production. The need to improve household farm income and relevance of the information obtained were mentioned by 14% of the respondents.

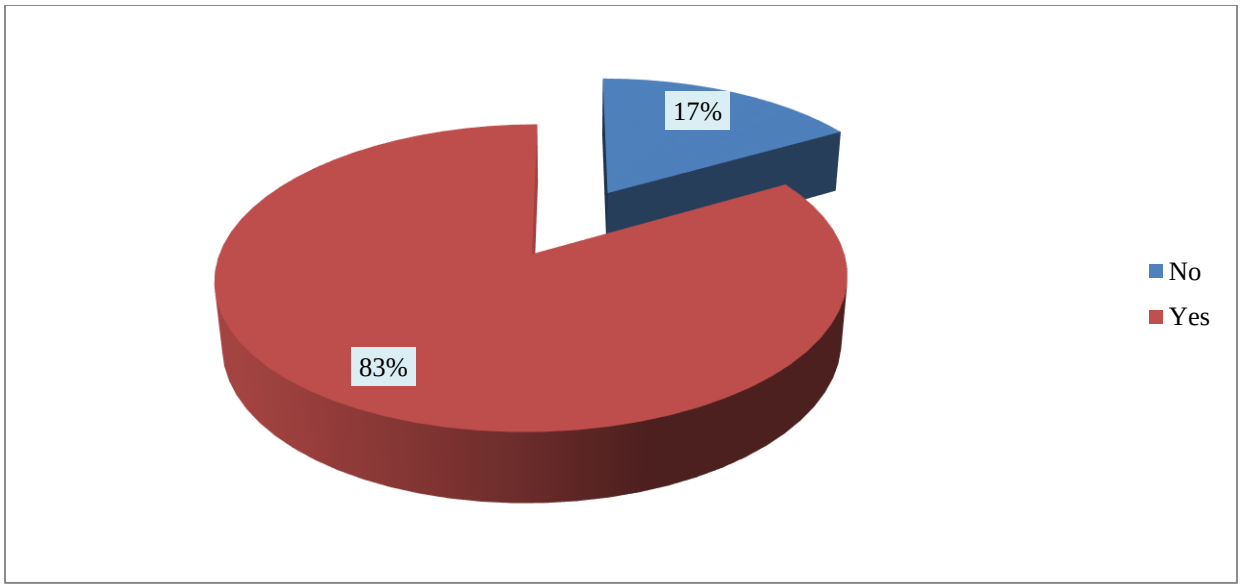

Figure 4. 7: Adoption of technologies disseminated through PV

The study findings indicated that (37%) were motivated by the interesting and practical and new technologies they watched. The other 35% were motivated by the need to improve farm production. The need to improve household farm income and relevance of the information obtained were each mentioned by 14% of the respondents. This corroborates with a study by (Isiaka, 2007) on the use of videos to teach rural children on agriculture where he found out that use of videos is as powerful as real life demonstration, and with the effect of encouraging adoption. In Benin, more than 95% of the farmers who watched videos on the rice parboiling adopted various good practices compared to only about 50% of farmers who attended training workshops (Zossou, et., al. 2009a). PV contributes to understandability of the message in that something that is seen done sticks to the minds of the people (*Fig. 4.8)*.

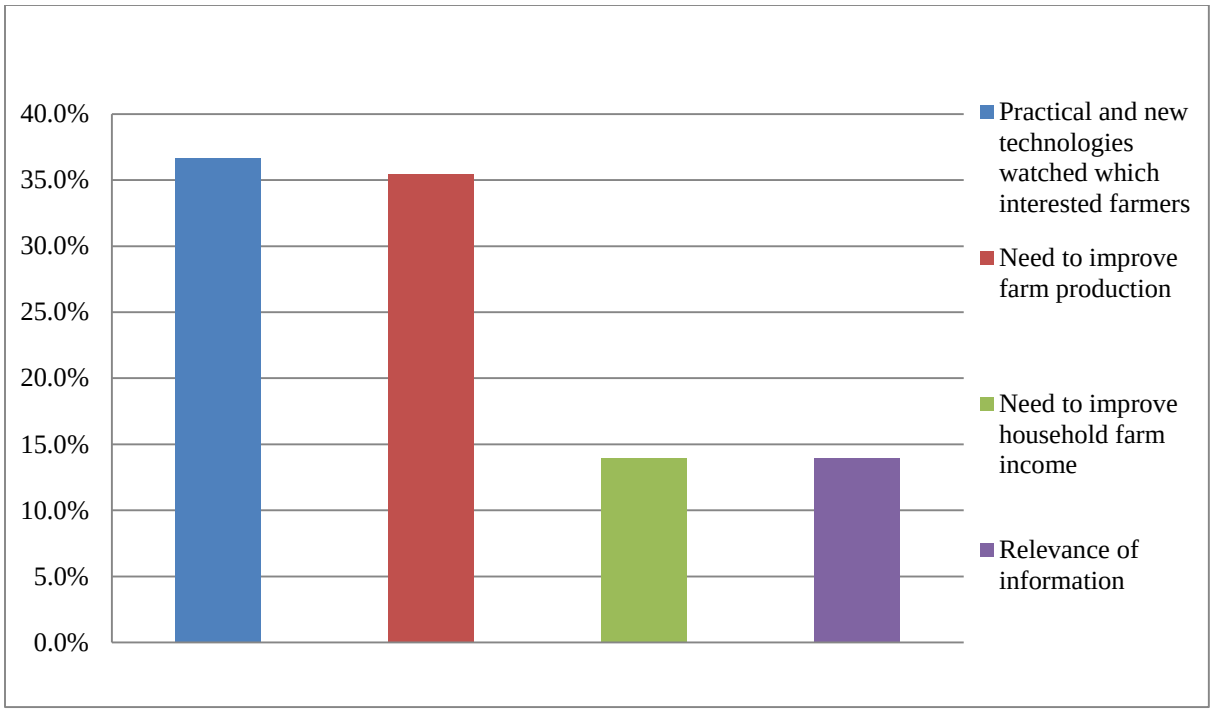

Figure 4. 8: Motivating factors for adoption of technologies disseminated through PV

4.8 Comparative advantage of the use of participatory video as a dissemination tool vis-à-vis government extension method (face to face through extension agents)

4.8.1 Farmers' perception of PV in agriculture extension over Government extension

Among the users of PV, 38% rated the use of PV as a very effective source of information. This was closely followed by 37% of the respondents who acknowledged that it is effective. Those who said that it is fairly effective were 20% while the remaining 5% said that it is not effective at all (*Fig. 4.9).* This is consistent with the findings by USAID, (2013) which found out that an estimated that 36 percent of viewers had changed their farming practices after watching an episode in TV reality show "Shamba Shape Up".

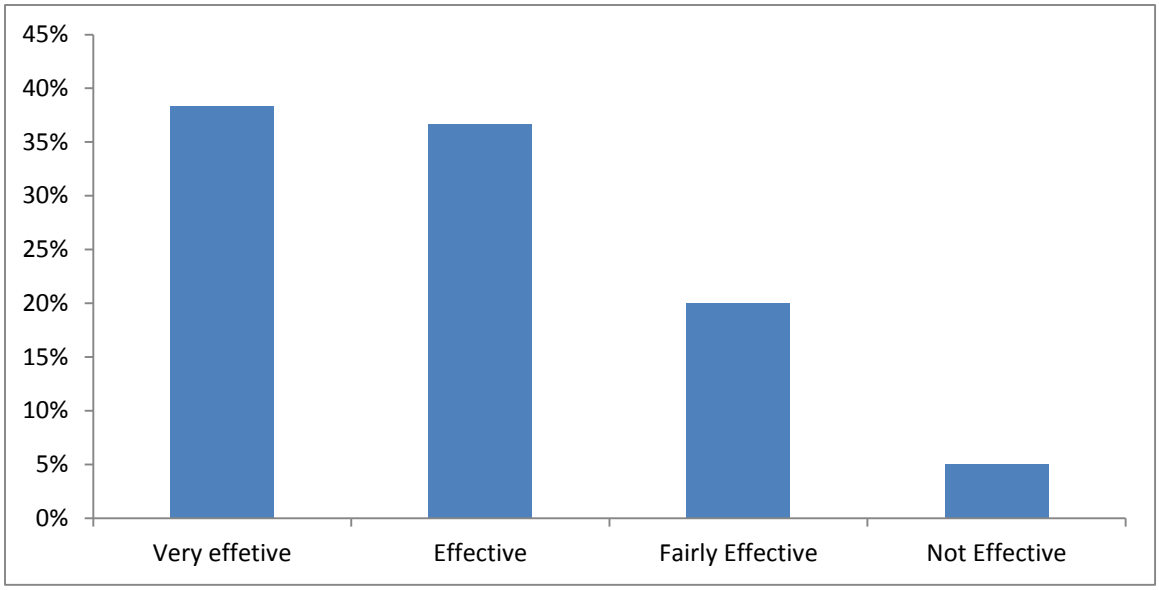

Figure 4. 9: Advantages of using PV over Government Extension methods

The major reasons why the farmers prefer PV over face to face interactions with extension agents as shown in *Fig. 4.10* ranged from the ability of PV to demonstrate (visual) as mentioned by 30% of the users, storage of information for future reference mentioned by 21%, ease of sharing information from one farmer to the other through PV as cited by 16%. Another 15% of the respondents believed that the information is readily available when required by the farmers. PV also reaches a large number of farmers within a short time and the message is easy to understand as indicated by 12% and 7% respectively (Fig. 4.10). These findings are in line with the findings of (Cai 2013) who showed that PV is more effective than government extension officers with some of the advantages being: gives clear training information, provides good examples and more attractive to the farmer.

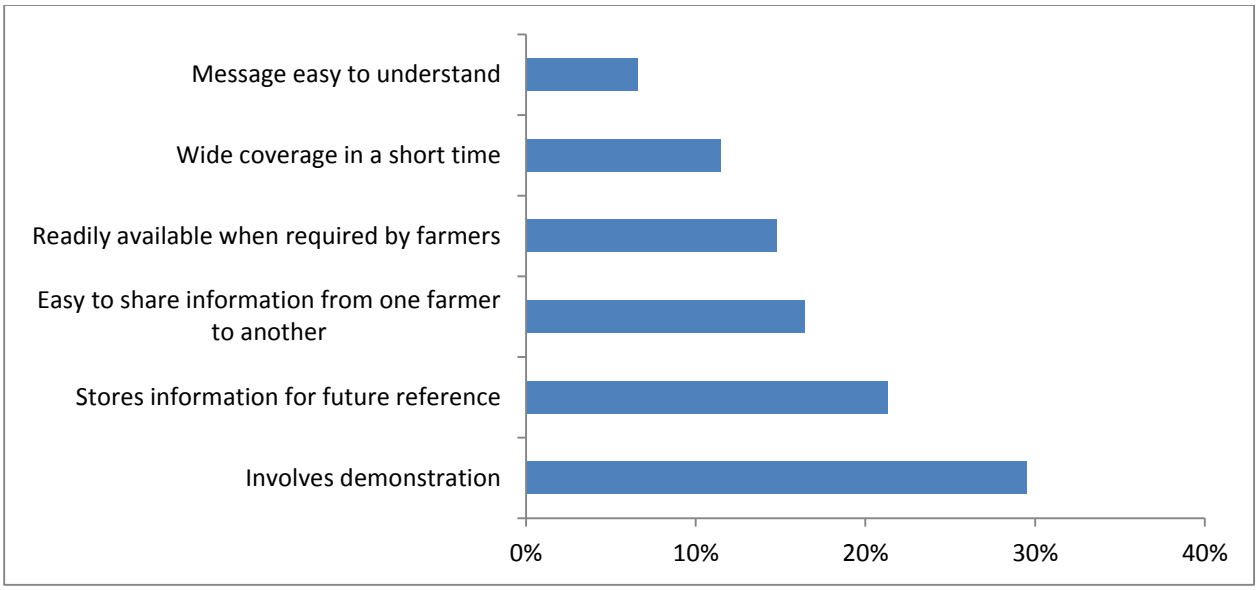

Figure 4. 10: Reasons for Effectiveness of PV over Government Extension

Disadvantages of PV vs. face to face extension workers

As shown in *Fig. 4.11*, one of the disadvantages of PV as mentioned by 23% of the respondents is that it is not easily accessible. The high initial cost was also cited by 20 % of the respondents whereas lack of feedback i.e. no interaction with the presenter for clarification of unclear issues, was mentioned by 19% of the respondents. The other challenge mentioned by 17% of the respondents was lack of electric power in most villages to enable them view the video. The other respondents, also at 17% mentioned requirement of skills to operate the videos. Technical errors like breakdown of computers or video machines were identified by the remaining 5%. These findings contradict the findings of a study in Uganda that established from the farmers that the major disadvantages of PV has to do with lack of feedback from farmers unlike the extension worker method (Cai 2013) *(Fig. 4.11).*

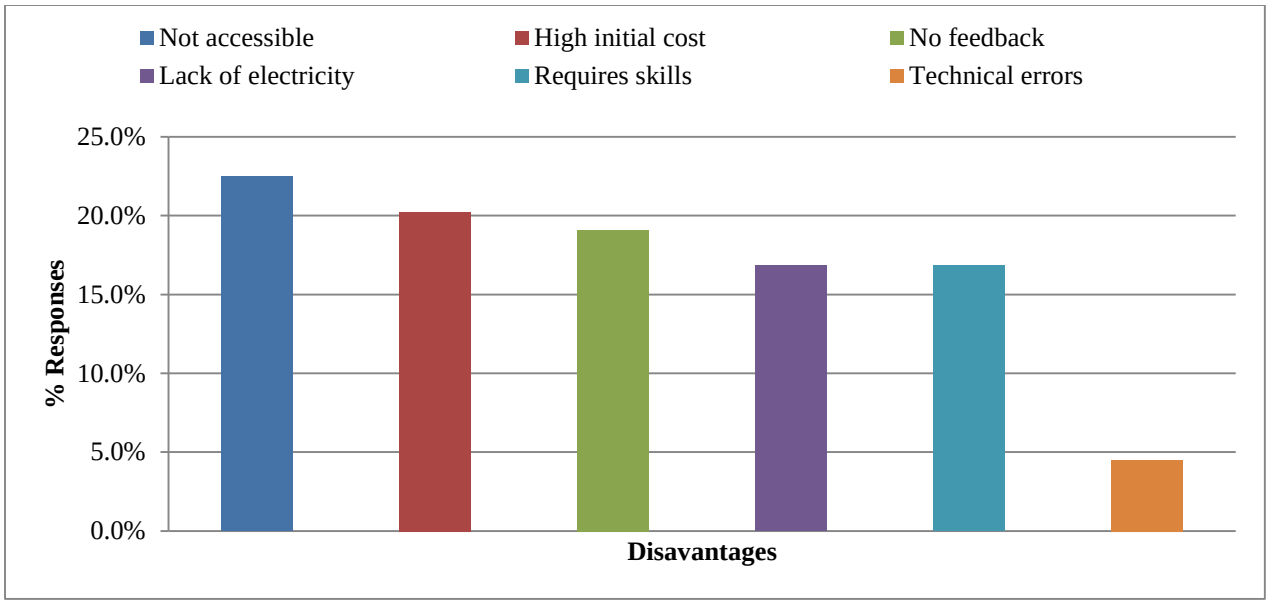

Figure 4. 11: Disadvantages of Participatory Video Method

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Findings

The first objective of the study was to assess the factors that influence the adoption of participatory video for dissemination of agricultural information. In relation to this the study findings showed that sources of income, distance to extension offices and group membership significantly affected the adoption of PV as a communication tool among small holder farmers. Access to credit was significant with lack of access to credit discouraging the use of PVs in that farmers are not able to obtain the Kits that would enable them to watch the videos. It was also established that group membership plays a key role in adoption of PV. This enables farmers who otherwise may not afford to own their own PV kits to be served by one kit owned in the group. In addition, farmers in groups are able to learn from each other on current issues and new technology. Distance to extension offices also played a key role in adoption of PV. Because of unavailability of extension officers the adoption of PV by farmers is acquired to fill the gap occasioned by lack of extension officers.

On the second objective the study found out that majority of the respondents (93%) were of the opinion that PV addresses information needs while only 7% said that their information needs are not addressed by PV. The study found out majority of the farmers (75%) perceived PV to be providing useful information to farmers with 25% of the farmers believing that PV does not provide useful information to farmers. The study also established that 40% of the farmers were of the view that PV was readily accessible to them while 27%, 18% and 15% were of the view that PV was accessible to them, were not sure about PV accessibility and could not access PV

respectively. The study also demonstrated that 75% of the farmers perceive the information communicated through PV to be useful with 25% saying it is not useful.

On the third objective of the study which was to establish the application of agricultural technologies disseminated through participatory video among smallholder farmers. The findings of the study showed that a great majority (83%) of the farmers who learn of agriculture technology through PV adopted them with the remaining 17% of farmers not adopting agricultural technology that they learnt through PV. The study further established that the following technologies were most sought for and adopted by farmers; drought tolerant maize variety technology (31%), livestock production (13%), new varieties of legumes (11%), soil and water management (11), Field pest and disease control (9%), minimum tillage (6%), mulching (5%), Improved storage methods(3%), adaptation to climate change (3%), tissues culture banana production (3%), general agriculture (3%) and soya bean production (1%).

The findings of the study also revealed that a great majority of farmers (98%) believed that PV encourages farmers to try new agricultural technologies. The findings also indicated that majority of the farmers who had not adopted technology learnt through PV were in the process of doing so, with 30% and 10% citing small pieces of land and difficulty in understanding the message respectively. The results of the study indicated that PV motivated the farmers to adopt new technologies due to the following reasons: interesting and practical (37%), motivation to improve farm production (35%), need to improve household farm income (14%) and relevance of the information (14%).

Concerning the fourth objective which was to determine comparative advantage of the use of participatory video as a dissemination tool vis-à-vis government extension methods the study

found out that majority of farmers (75%) rated PV extension services as effective while 25% rated PV extension services as not effective. It was also established from the study that majority of respondents (98%) would recommend PV to other farmers. The study also established that the reasons why farmers would recommend PV to others to be as follows: It encouraged the use of demonstration(30%), stores information for future references (21%), ease of sharing information (16%), availability of information when needed (15%),easily accessed by many (12%) and easy to understand (7%) respectively.

The findings of the study also indicated that majority (57%) of the farmers believed that the main advantage of PV over extension services has to do with its demonstration aspect. The farmers also cited ease of accessibility (13%), wider geographical reach in terms of contents (11%), can be stored for future use (10%), cost effectiveness (9%) and language barrier (1%) respectively. However, the study also established that PV had its disadvantages and these according to the farmers are difficulty in accessibility (23%), high initial cost (20 %), lack of feedback (19%), lack of electricity (17%), technical skills to operate (17%) and breakdown of computers/videos (5%).

5.2 Conclusion

Analysis of the relationships between variables in the study revealed that participants' income levels, distance from extension officers and membership to a group influence farmers use of participatory video. These findings may suggest possible future strategy that may employed by government and other stakeholders to introduce PV to farmers in rural Kenya. The findings possibly suggest that introduction of the PV should first be targeted at farmers in groups, farmers located far away from the extension officers and farmers with relatively higher income level, they can easily acquire communication equipment required to watch the videos. The findings

therefore provide insight on policy intervention that can be targeted towards rural farmers. Such policies should focus on promoting accessibility to credit thus enhancing the financial power enabling them to purchase the PVs. These finding also attest to the crucial role played by farmer groups in promoting the livelihood of farmers, and hence there is need for the national and county government to facilitate and strengthen the formation of such groups since they enhance the farmers' innovative capacity and ability to share knowledge and information (Tantisantisom, 2011).

The findings of the study show that farmers perceived PV as useful to them. This is a testimony that PV information when made relevant, reliable, timely, and suited to the language preferred by the farmers has the potential to transform farming among the small scale farmers. This is evidenced from studies which have indicated that when farmers are provided with relevant information they are more ready to accept and adopt the technology resulting to improved production and income levels (Van Mele 2010; Chowdbury et al. 2010). Farmers should not only be provided with relevant information but also in simple formats that are easy to use for them to apply in their farm. These results point to the need for the government and other stakeholders in agriculture to increase the use of PV as they are perceived to be the most available and most reliable sources of information.

The lack of infrastructure and existence of skills shortages hinders the utilization of emerging new technologies such as PV that support small-scale farmers' access information on agriculture extension. Marginalized small scale farmers may lack pre-requisite infrastructure and skills to use these communication tools and even implementing the new model of farming systems. Thus it is of necessity for farmers income to be enhance to enable them acquire infrastructure. Besides it is essential to provide capacity building at different levels to promote access to relevant

agriculture extension information thus increasing agricultural productivity and sustainable farming. According to (Pemsl et .al 2005) it is very important to train farmers when introducing a new concept on knowledge dissemination.

The study findings are indicative of the challenges that have been faced with the use of traditional government extension offices. These include inadequate extension officers and limited frequency of interaction between farmers and extension officers. Participatory video can offer solutions to some of the challenges experienced in the use of government extension officers. This is due to the fact that the PV can reach masses of farmers within a short duration thus being very effective tool in agricultural knowledge dissemination. Effectiveness of video can be realized if pictures are very clear and content packaged in the local languages of the people that are meant to watch. It should therefore be integrated in the common channels of agricultural knowledge dissemination to complement farmer to farmer method which is the most common but not effective.

Studies have demonstrated that including both government extension methods and video could be more effective than the use of government lecture methods alone (Shanthy and Thiagarajan, 2011). In the current study, a comparison of PV and the use of government extension methods found that farmers who received the PV still received government extension methods as source of information for new technologies. These findings suggest that video can be an effective complement to the traditional mode of government extension methods, especially for groups with relatively low prior knowledge about a topic. This is because the PV embraces demonstration aspect that makes it more appealing to the farmer, and this when combined with other government extension services has the possible of making extension services more effective to farmers thus translating to increased production and income for farmers.

In this study, a comparative advantage of using participatory video in dissemination of agricultural technologies vis-à-vis government extension methods showed that majority of farmers believed that PV is effective as compared to the use of government extension methods. This result indicates that the PV only method can be as effective as the traditional government extension approaches. In this case, the findings suggest that video can replace the traditional government extension methods with even more benefits to the farmers. This is attested in the study with 98% of farmers saying that they would recommend PV to other farmers with farmers citing that PV is more beneficial to farmers due to its demonstration aspect. Previous studies have indicated that PV alone can be more successful in creating interest in rice parboiling technology than a traditional government method of using extension services (Zossou et al. 2010). In some instances the use of PV alone was found to be more effective in increasing farmer's knowledge that the use of government extension officers alone (David and Asamoah 2011).

The current study suggests that video may be an alternative or a supplementary method to increase the frequency and quality of training. PV could offer solution to addressing the challenge on how to scale up the supply of trainers of trainees by reducing the technological assistance needed requirement for each farmer (Van Mele 2011). Besides, video also does not require face-to-face presentation by skilled trainers, a limited resource in rural areas in Kenya. Studies by (Van Mele 2011; Van Mele 2006) established that video training was cheaper than traditional extension methods such as farmer-to-farmer extension and lecture, more so when more farmers need to be trained. This according to him is because video provide information that can be easily processed.

The findings of the study showed that the main disadvantages of the PV method are difficulty in accessing the PV, high cost of the video equipment and limitation of feedback and interaction with extension officers. The study findings show that any strategies to introduce the use of PV as dissemination tool should focus on leveraging on the available resources to further the use of PV. There is also need to encourage interactive training which play a major role in enabling farmers to accept and adopt new technologies since it encourages an understanding of the theories and practical applications involved (Coldevin 2003). The study results having confirmed that farmer groups are the most preferred source of information suggest that PV can be more beneficial to farmers if integrated with the use of government extension officers and when shared through groups, and when combined with an agricultural specialist.

5.3 Recommendations

The emergence of PV in developing countries offers a new technology and new opportunities for acquiring and disseminating information. Farmers' existing information channels are built on social networks and it is important that any dissemination of information through PV to use existing social networks for better effectiveness. Integration of PV in agriculture extension is thus central to the promotion of horizontal learning and transfer of knowledge which is crucial in capacity building. PV also encourages storage of information for future use and references. Thus there is need for the government to develop infrastructure and strategies that promote adoption of PV in agriculture extension.

There is need to use participatory video to disseminate agricultural information as a supplement and compliment to extension agent contact, in order to address some of the challenges that have been faced through the use of government extension methods. This is because different platforms are required to address different needs of the farmers. Participatory video as an information

dissemination technology should thus be embraced by the national and county governments, and all stakeholders. Efforts should be made by providers of agriculture extension information to conduct periodic needs assessment in order for them to provide timely and relevant information that meet the needs of the farmers.

Additionally, farmers should be provided by experiential learning trainings in their groups through the use of participatory videos. This will help facilitate acceptance and use of participatory video thus contributing to the adoption, replication and sustainability of participatory video as a communication tool. There is need for the national and county government to moderate and monitor the production of participatory video to ensure farmers access usable information. The national and county government should encourage partnerships among information providers with an aim to creating timely, useful, reliable and relevant information.

5.4 Suggestions for Future Study

There is need for future studies to include the use of quantitative and qualitative methodology in establishing effectiveness of participatory video for dissemination of agricultural information. As opposed to the study that only used quantitative methods to establish the effectiveness of PVs. Future comparative studies also be carried out on effectiveness of participatory video in varying geographical context to better gain an understanding on its effectiveness at national level in Kenya. Besides a study should be conducted to assess the cost-effectiveness of video training and compare it with that of conventional training for both small scale and large scale training efforts.

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APPENDIX: QUESTIONNAIRE

Identification and Interview Background

The University of Nairobi is conducting a study on the "Effectiveness of participatory video as a tool for agricultural extension used by smallholder farmers" particularly those of Kabuchai Division, Bungoma County to share agricultural information. This study is done so as to obtain insights on farmer's perception on the use of participatory video as a tool for dissemination of agricultural information, establish the utilization of agricultural technologies disseminated through PV, determine the factors that influence the adoption of PV as a communication tool and find out the comparative advantage of PV over face to face extension. The information gathered herein will be useful in assessing the effectiveness of participatory video in agricultural extension and therefore make recommendations for its adoption/application to supplement the efforts of extension agents ensuring that information on new agricultural technologies are accessed by all farmers to enhance agricultural productivity and thus achieve food security. Your participation is voluntary and the information gathered will be used purely for research and will be treated as confidential.

Start Time:	**End Time:**
Date of Interview	**Name of Interviewer:**
VARIABLE	**RESPONSE**
County	
Sub-County	
Division	
Location	
Sub-location	
Village	

SECTION A: Background Information of the Respondents

1. Respondent's Name: _____ Respondent's phone number: _____
2. What is your relationship to the household head? ***(Tick where appropriate)***
   1. Household head ***(Skip to Q4)*** ☐
   2. ☐

2. Spouse ***(Continue to Q3)***
97. Other ***(Continue to Q3)*** ☐

3. What is the name of the household head? _____

4. What is the gender of the household head?
1. Female ☐
2. Male ☐

5. What is the age of the household head? _____

6. Highest level of Education attained by household head *(Tick where appropriate)*
- **1.** University [ ]
- **2.** Tertiary college [ ]
- **3.** Secondary [ ]
- **4.** Primary [ ]
- **5.** None [ ]
- **97.** Other *(specify)* _____

7. What is the total number of persons living in the household? _____

8. How many years have you been farming? _____

9. What are your main sources of income for the household? *(Tick where appropriate)*
- **1.** Salary [ ]
- **2.** Pension [ ]
- **3.** Farming [ ]
- **4.** Business [ ]
- **97.** Other *(specify)* _____

10. Is any of your household members in any farmer group? Yes [ ] No [ ]

11. Do you have access to credit facilities? Yes [ ] No [ ]

12. Asset owned in the household *(tick appropriately)*

Asset			Number owned
i.	Land	[ ]	……..
ii.	Improved Cows	[ ]	……..
iii.	Vehicle	[ ]	……..
iv.	TV	[ ]	…….
v.	Radio	[ ]	…….
vi.	Posho mill	[ ]	…….
vii.	Mobile Phones	[ ]	…….
viii.	Electricity	[ ]	…….
ix.	Solar panel	[ ]	…….

Information about Agriculture and Agricultural Landholding

13. Land tenure *(tick appropriately):* Individual [ ] Leasehold [ ] Communal [ ]

14. What is your average farm size (Own land in acres)?.....

15. What was the average land your household cultivated in the previous cropping year?

Land category	Short Rain season Area cultivated (Acres)	Long rain season Area cultivated (Acres)
Own land		
Rented in land		

16. Please indicate the crops grown and their yields in the previous main season.

Crops	Yields (Quantity in Kgs)

17. How many of the following animals do your household currently own?

Livestock	Tick appropriately (x)	Number owned
Cattle		
Goats		
Sheep		
Poultry		
Donkey		
Others (Specify)		

SECTION B: Access to Agricultural Extension Services and awareness and use of PV

18. What is the distance to the nearest extension office? _____

19. How often do you interact with the extension officers? Daily [ ] Weekly [ ] Monthly [ ] Quarterly [ ] Other *(specify)* _____

20. What kind of information do you mostly seek from the extension offices?

a) _____
b) _____
c) _____
d) _____
e) _____

21. What are the challenges that you face in search of agricultural information?

a) _____
b) _____
c) _____
d) _____
e) _____

22. Please rank and evaluate the sources of agricultural information that you use in your farm production **(Use codes below)**

Source of information **Use Code A**	Type of Information (Subject matter) **Use Codes D**	Reliability of information **Use Code B**	Relevance of information **Use Code C**

Code A (Sources)

1. Government extension service
2. Farmer groups
3. Neighbour farmers
4. Radio/TV
5. Research centres
6. NGOs
7. Newspapers
8. Mobile phone
9. Other (Specify)

Code B

1. Fully reliable
2. Reliable
3. Fairly reliable
4. Unreliable

Code C

1. Fully relevant
2. Fairly relevant
3. Relevant
4. Irrelevant

Code D

1. Drought tolerant maize varieties
2. New varieties of legumes
3. Soil and water management
4. Minimum tillage
5. Leaving crop residue in the field
6. Improved crop storage methods
7. Adaptation to climate change
8. Livestock production
9. Field pest and disease control
10. Others*(specify)* **(97)**

23. Which of the above sources of information are frequently used and why?

Source *(Use codes A above)*	**Reason**

24. Do you face any challenges in applying the information you get? Yes [ ] No [ ]
If Yes, Why?

_____

_____

25. i) Are you aware of any Information and Communication Technologies (ICTs) used in agriculture extension? Yes [ ] No [ ]
ii) Have you used any and how did you learn about them?
iii) Rate the effectiveness of the ICTs used **(write code)**
(1) Not Effective (2) Fairly Effective (3) Effective (4) Very Effective

ICT Used	**How did you learn about them**	**Effectiveness**

26. Have you heard/ are you aware of the use of Participatory Video (PV) in agriculture extension in this area?

Yes [ ] No [ ]

27. How did you learn about PV?

28. Have you watched a Participatory Video for agriculture?

Yes [ ] No [ ]

(If No, skip to Q48)

29. If yes, when did you first watch it?

Over the last two years [ ]
One year ago [ ]
6 months ago [ ]
3 months ago [ ]

30. If you need to watch an agricultural video how likely is it that you will be able to access it?

1. Extremely likely 2. Quite likely 3. Neutral 4. Quite unlikely 4. Extremely unlikely

31. Where do you go to watch the video? ***(Tick the answer)***

Home [ ] Farmer field School [ ] Barazas [ ] Field days [ ] Neighbour farmer [ ] Others *(specify)* …….

32. How effective is the use of PV in dissemination of agricultural information (agricultural extension) compared to government extension service with regard to the aspects below? *(Tick where appropriate)*

Aspect	Very Effective	Effective	Slightly Effective	Not Effective
Cost of accessing information				
Relevance of information				
Accessibility of information				
Frequency of access				
Understandability of the message				
Coverage				

33. From your own experience how useful (quality of content) is the agricultural information obtained from the PV?

1. Very Useful **2.** Slightly Useful **3.** Slightly not useful **4.** Not Useful

34. For wide adoption of PV what in your opinion needs to be improved?

a) _____
b) _____
c) _____
d) _____
e) _____

35. Does PV address your information needs? Yes [ ] No [ ]

SECTION C: Rate of utilization of agricultural technologies spread through PV

36. What agricultural technologies/farming practices did you/have you learnt from PV? **(Refer to Codes D)**

37. Did you/have you adopted the technologies learnt through PV in **Q36** above?

Yes [ ] No [ ]

(If Yes, continue to Q38)

38. Please list the technologies that have been adopted, when it was watched and practiced

Agricultural Technology/ Farming practices adopted	Year watched	Year implemented

39. If No to **Q36**, why?

40. What motivated you to adopt/utilize the above technologies?

a) _____
b) _____
c) _____
d) _____
e) _____

41. In your own opinion, is there any improvement in your farm production after you implemented the technologies you learnt above? If yes, Give the reason

42. Do you think the use of PV in agricultural extension make you to try more new technology for agricultural production? Yes [ ] No [ ]

SECTION D: Comparative analysis of PV versus face to face extension methods

43. How do you rate the use of PV in agriculture extension compared to Government extension service? **(Circle the answer)**

1 Not effective **2** Fairly effective **3** Effective **4** Very effective

44. What are the advantages of using PV over face to face extension with an extension agent?

a) _____
b) _____
c) _____
d) _____

45. What are the major challenges/limitations of using Participatory video compared to government extension method?

a) _____
b) _____
c) _____

d) _____

e) _____

46. Would you recommend PV to other farmers and agricultural stakeholders as a viable tool for agricultural extension?

Yes [ ] No [ ]

47. If yes, why?

48. How do you address the information constraints?

a) _____

b) _____

c) _____

49. Would you be interested in using new ICTs e.g. PV in accessing agricultural information? Yes [ ] No [ ]

50. If Yes, which ones and why?

51. If No, why?

THANK YOU FOR YOUR TIME AND RESPONSE

APPENDIX II: Table 4. 6: Correlations table

Correlations		PV Awareness	Gender	Age	Education	Income	Group mem.	Credit	Land size	Dist. Extn offices
Gender	Pearson Correlation	0.045								
	Sig. (2-tailed)	0.623								
Age	Pearson Correlation	0.003	-0.064							
	Sig. (2-tailed)	0.97	0.486							
Education	Pearson Correlation	0.034	0.027	-0.047						
	Sig. (2-tailed)	0.716	0.766	0.609						
Income	Pearson Correlation	.201*	-0.126	0.14	-0.053					
	Sig. (2-tailed)	0.028	0.171	0.127	0.567					
Group mem.	Pearson Correlation	.234*	-0.007	-0.039	0.045	-0.059				
	Sig. (2-tailed)	0.01	0.937	0.672	0.622	0.525				
Credit	Pearson Correlation	-0.091	-.187*	.227*	0.087	-0.06	.199*			
	Sig. (2-tailed)	0.322	0.041	0.013	0.344	0.514	0.029			
Land size	Pearson Correlation	0.007	0.003	.327**	0.15	-0.055	-0.002	.288**		
	Sig. (2-tailed)	0.942	0.97	0	0.102	0.554	0.983	0.001		
Dist. extension offices	Pearson Correlation	.202*	0.009	0.001	0.035	-0.02	0.03	-0.16	-.187*	
	Sig. (2-tailed)	0.027	0.922	0.99	0.708	0.829	0.742	0.084	0.041	

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).