

Communication Channels in Adoption of Technology with a Focus on the Use of Purdue Improved Crop Storage (PICS) among Small Scale Maize Farmers in Kenya

Naomi Muriuki* Catherine Munyua Dolphine Wangwa

Department of Applied Community Development Studies, Egerton University, PO box 536, Egerton, Kenya

Abstract

Purdue improved storage is a technology that uses plastic bags to achieve hermetic storage of grains. Although Maize is Kenya's main staple food, it has been plagued by post-harvest losses with small scale farmers representing the most vulnerable populations. These losses have led to frequent food shortages being experienced in Kenya with most of the available storage pest control strategies being unavailable to farmers due to their cost. Purdue Improved Crop Storage (PICS) technology was introduced in Kenya targeting to cut down maize post-harvest losses by 80 percent without use of pesticides. Adoption process of the PICS technology is therefore paramount and must be supported by having effective flow of information from the manufacturers to the small scale maize farmers. With communication channels being key in information dissemination, there is need for implementers of the PICS technology to ensure that these channels are properly utilized for a successful adoption process.

Keywords: Adoption process, Agricultural technology, Communication channels, Extension service, PICS technology.

1. Introduction

Maize producers in Sub-Saharan Africa have experienced post-harvest losses from pests, with small-scale producers representing the most vulnerable populations (Food and Agricultural Organization (FAO), 2004). Kenya specifically has been experiencing great losses attributed to pests and post-harvest constraints among other causes. The country loses 30 to 40 percent of the total grain output during post-harvest handling (Rembold, Hodges, Bernard, Knipschild and Leo, 2011).

In Kenya maize is the main staple food and more than 75% of the local cereal production is by small scale farmers, while 90% of rural households grow maize (Kang'ethe, 2011). With the post-harvest grain losses situation in Kenya, the available management strategies for minimizing storage pest losses are cultural control, physical control, indigenous methods, legislative control, biological control, host plant resistance and chemical control (Songa, 2004). Considering that most of these strategies are not available for application by farmers due to environmental issues, pest resistance and cost, there is need for technologies or methods that are effective, affordable and safe for humans and the environment. Evidence suggests that hermetic technologies like Purdue Improved Crop Storage (PICS) bags can be effective against larger grain borer which is key maize storage pests (Jones, Alexander and Lowenberg-DeBoer, 2011).

Although research has come up with many useful innovations, how far people succeed in agricultural endeavors depends largely on the availability and access to accurate and reliable information in all the stages of adoption process which must be via various communication channels to the intended audience farmers (Oladele, 1999). The stages of the adoption process include awareness, persuasion and decision stages. In awareness stage, a farmer becomes aware of an innovation and has some idea of how it functions. In persuasion stage, the farmer forms a favorable or unfavorable attitude to the innovation as they actively seek for information on an innovation. It is also at this stage when farmers require information in order to be in a position to decide whether innovations have attributes that suit their needs and circumstances and are therefore worth adopting. At the decision stage, a farmer engages in activities that would lead to rejection or adoption of the innovation. By the time a farmer is implementing the new idea, he or she has already put it into practice (Sahin, 2006). This therefore is a conviction on the relevance of flow of information at all stages of the adoption process. Therefore it is of importance to ensure right utilization of communication channels in reaching farmers with PICS messages for successful adoption process.

The various communication channels through which farmers can receive information on the utilization of PICS include modern channels such as mass media and extension agents and traditional channels like interpersonal channels. The potential of these channels for effective communication with reference to PICS will be the focus of this paper.

1.1 PICS Technology

PICS technology is hermetic method of grain storage whereby dried maize to appropriate moisture content is filled in a bag with a 20-30cm neck tied securely. This bag is then surrounded by a second bag with the same

thickness and finally securely tied into a third woven nylon or polypropylene bag. The bags prevent insect damage by suffocating the insects and also by inhibiting penetration (Murdock, Seck, Kitch and Shade, 2003). PICS technology was first launched in 2007 in Purdue University with main aim of helping farmers to store cowpeas with minimal losses without use of chemical (Coulibaly et al., 2012).

Kenya loses 30 to 40 percent of the total grain output due to inefficiencies in post-harvest handling especially during harvesting and storage (Rembold et al., 2011). With the high rate of post-harvest losses in Kenya it is important to explore alternatives that are affordable and efficient in terms of the cost and prevention of storage pest damage without causing any health threat to the consumers. When compared with ordinary bags, the losses when PICS are used are less than two percent, which is an 80 percent reduction in grain losses (Murdock and Baoua, 2014). The PICS thus provide a promising choice for maize storage among small scale maize farmers in Kenya.

In Kenya the PICS bag was introduced in 2013 for maize storage in various counties including Nakuru County where it is being distributed up to date. To facilitate broad-based farmer uptake and mainstreaming of this technology, effective, efficient and ultimately, sustainable delivery mechanisms are needed (Coulibaly et al., 2012). In this context information has been identified as one resource required and need to be used in order to make an informed decision (Lucky and Achebe, 2003). The channels of communication of information and their potential in facilitating the adoption process of PICS is an important consideration for this crucial storage technology.

1.2 Communication Channels in Dissemination and Acquisition of Information

Communication channels are vehicles through which information is transferred or received with relevance, timelessness, accuracy, cost effectiveness, reliability, usability, exhaustiveness and aggregation level (Tucker and Napier, 2000; Robinson et al., 2005; Momodu, 2002). Efficiency of any agricultural technology generated and disseminated depends on effective communication which is crucial for the adoption process (Oladele, 1999). Modern communication channels include extension services and mass media while traditional channels include interpersonal channels such as farmers' own experiences, family members, friends and farmers' neighbours (Boz and Ozcatalbas, 2010; Dutta, 2009). Both modern and traditional channels of communication can be relevant means of conveying information on PICS to small scale maize farmers. The channels have their strengths as well as weaknesses which gives insights on their application in promoting the use of PICS.

1.2.1 Modern Channels

Mass Media Channels

Mass media channels are all those means of transmitting messages that entail medium such as radio, television, newspapers and magazines which enable one or few individuals to reach a large audience (Sahin, 2006). In situations where rural farmers are not faced with constraints in accessing agricultural information, media such as rural radio, has been effectively used in delivering agricultural messages to rural farmers (Opara, 2008).

Purdue University employed channels such as television, radio, newspaper and media coverage of open bags ceremonies (OBCs) to pass messages on PICS technology and stimulate demand by farmers (Coulibaly et al., 2012). In West and Central Africa PICS project made use of radio for communication of PICS messages to the rural communities. In addition commercial messages were disseminated during harvest and storage period with main focus on availability of the bags in different locations in the country (Moussa, Otoo, Fulton and Lowenberg-DeBoer, 2009). Opara in his research in Nigeria also listed radio as an important medium of agricultural information (Opara, 2008).

Comparisons of adoption of PICS technology between villages with and without radio in West Africa indicated that radio has significant effect in reinforcing the use of PICS bag (Moussa et al., 2009). In Kenya mass media channels such as radio and television have been utilized in communicating PICS messages but have not yet been tested for efficiency in the PICS technology adoption process. Namaseb (1999) noted that the agricultural information transmitted through media enhance agricultural productivity of farmers when they have access to it. However, in disseminating this information, it is imperative that the specific information needs of the large audience are taken into consideration so as to ensure that their needs and aspirations are met.

A major strength of mass media channel is disseminating information to a large number of people irrespective of their distance from the information source (Sahin, 2006). It also ensures that information is delivered quickly and accurately as well as ensuring increase in level of public knowledge. Mass media can also change cultural norms that already exist for a long time and attitude of society itself (Virginia, Priyanka and Sunita, 2013). These strengths of mass media channels make them a possible means of disseminating information on PICS especially for small scale maize farmers. Mass media can effectively facilitate the adoption process that will enable farmers tap into the advantages of this post-harvest technology.

Extension Services

Extension is a communication process whereby various participants are linked to exchange information and is a critical requirement for sustainable development (Arokoyo, 2003). Agricultural extension is an out of school

education for rural people while the extension agent is the person charged with providing knowledge and information on particular innovations to farmers (Solomon, 2011). With the objective of Agricultural extension in developing countries including Kenya being to improve the productivity and livelihoods of rural farmer and their families, the importance of agricultural extension in relation to the fight against poverty has been underscored in the Strategy to Revitalize Agriculture (SRA) in Kenya (Muyanga and Jayne, 2006).

Opeke and Ifukor (2000) asserted that information for rural development should be disseminated through government and non-governmental agencies working in the rural areas hence making available external information in formats which can easily be understood by the rural people especially women. Therefore extension service is a relevant and key measure to be employed in disseminating agricultural information to farmers since they often work towards quickening the decision-making process by employing strategies such as demonstration trials and provision of technical knowledge to the farmers.

Agricultural extension and advisory services, public and private extension organizations play a major role in providing farmers with information, technologies and education on how to increase agricultural productivity to enhance food security and income levels of smallholder farmers. Extension also plays a role in organizing people together to take a group or common action. The Agricultural Extension Agents (AEAs) pay regular visit to farmers and provide them with appropriate advice and technologies to improve their agricultural productivity. Agricultural extension also facilitates problem solving, creates links to markets and other players in the agricultural value chain and provides access to information, skills, and technologies (Ibrahim, 2014).

A study by Ozowa (1995) on information needs by small scale farmers in Africa concluded that of all the existing channels of agricultural communication in Nigeria, farmers ranked extension highest in terms of providing credible information and advice especially on agricultural technology. A study in Kenya by Njuguna and Kooijman (1994) also reported government extension as a source of agricultural information top ranked by farmers. Experience in Cameroon suggested that village level demonstrations by the extension agents are the single most effective method for facilitating adoption and was extremely cost effective (Moussa, 2009). The implication is that extension service is a communication channel that can be used to foster adoption of PICS. Agricultural Extension Agents can provide the information that small scale farmers need to make informed decision on use of PICS for effective post-harvest storage of maize.

1.2.3 Traditional Channels

Interpersonal Communication Channels

Interpersonal channels involve a face-to-face exchange between two or more individuals. It is the exchange of ideas and information between sender and receiver. The mode of interaction is usually of a conversational nature and involves the exchange of either verbal or non-verbal information between two or more people in a face-to-face or voice-to-voice setting (Sahin, 2006). In interpersonal communication setting, the process is automatic and participants decide to speak when they choose and to whom they choose (Ugulumu and Inanga, 2014).

Interpersonal communication is important in passing agricultural messages since it dominates activities at home, office, market and elsewhere. It helps to break the barrier of formal relationships, generates warmth and creates harmony that is necessary for socio-economic development. In order to achieve effective communication of information, it is necessary for the participants to be close enough to enable them to conversationally interact. The major advantage of interpersonal communication is immediate response which may provide signal for the encoder to modify his subsequent message to achieve a determined objective (Ugulumu and Inanga, 2014).

In PICS information dissemination, farmers can become an important source of information for other farmers. This is because they interact closely in their day to day life. However, they need to be able to access information on technologies to be able to show, tell and learn. A study by Franzel, Wambugu and Tuwei (2003) on adoption and dissemination of fodder shrubs in central Kenya recommended that, farmers groups should be empowered to access information on new practices and that governments and development partners should not see their role as simply transferring technology and information to farmers. Rather, they should focus on assisting farmers groups to mobilize their own resources and enhance their ability to obtain information on improved practices from outside their villages. These findings emphasize the role that interpersonal channels can play especially in technologies that are important for small scale farmers. Maize farmers in Kenya can benefit greatly from other farmers and friends who have already acquired information on the use of PICS bags. Information on the use of PICS could spread faster if interpersonal communication channels are utilized.

2. Preference for Different Communication Channels

Prior identification of farmers' preference is important before initiation of any project since it can help to design more acceptable and cost effective development intervention programs. In addition, the likely extent of future adoption of research results has a strong influence on the efficiency of research and on the results of research priority setting exercises (Batz, Janssen and Peters, 2003).

Batz et al. (2003) writing on studies conducted in USA on analysis of farmers' preferences for information type, source, method of communication and farmers' attitude towards countryside stewardship

policies in Europe observed that farmers' preferences are influenced by the characteristics of the farm, farmer's land and the personal costs and benefits that farmers expect. The studies also suggested that sources and methods of communication of information should not only be based on their capacity to reach larger number of farmers, but also according to their perceived credibility and relevance among target audience.

In results of a study conducted in Nigeria, Opara (2008) emphasized the need for the extension agency to regularly identify those communication channels that farmers prefer, or use most, as this will enable them deliver agricultural information effectively to the farmers. An experiment conducted in Ethiopia on farmers' crops preferences helped to derive important policy implications for on-farm conservation, breeding priority setting and improved variety adoption in Ethiopia (Asrat, Yusuf, Carlsson and Wale, 2010). This therefore is a conviction on the need to consider farmers preferences when introducing any new agricultural innovation for adoption.

Interventions need to be planned and implemented in a manner that it will bring the highest benefit to the target group in line with the intended development path. Therefore, policy programs need to be congruent with farmers' priority problems and felt needs and fit the agro-ecological and socio-economic circumstances. Such development program interventions will have a greater chance of being accepted and practiced in a sustainable manner than programs based on temporary incentives and coercive pressure. Therefore there is need to have an insight into the farmers' felt priority, agricultural problems and determinants of farmers' preferences for development intervention programs (Bekele, 2006).

The implication for adoption of PICS by small scale maize farmers in Kenya is that, the preferred communication channel should be identified. It is important to verify which among the modern and traditional communication channels would be most effective in providing the farmers with the information they need to use PICS for maize storage.

Conclusion

As a result of intensive research efforts, there is increasing knowledge and introduction of new agricultural technologies. PICS technology is one of the research output designed to help farmers access an innovative low-cost and chemical-free storage technology. This technology also has potential in solving problems of post-harvest losses and hence its relevance in achieving food security. Different communication channels can be used to ensure that farmers get the required information to effectively use PICS to store their grains.

In Kenya small scale maize farmers can benefit by use of PICS to reduce post-harvest losses, increase productivity and enhance food security. A technology like the PICS if adopted can improve the livelihoods of small scale maize farmers in Kenya by ensuring household food security and improved income. Reduced post-harvest losses of maize would mean sufficient maize for food which is a main staple as well as sale to raise income for other needs like health and education. PICS use further ensures a safer environment for all by reducing the use of pesticides to control post-harvest pests.

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