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The Effect of the Nature of Messages Conveyed Between the Extension Officers and Farmers on the Adoption of Irish Potato Farming in Meru County

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Abstract

This study was an investigation of the effect of the nature of messages conveyed between extension officers and farmers on the adoption of Irish potato farming. The problem of this study was that past studies had limited focus on the nature of extension messages conveyed between extension officers and farmers on adoption of Irish potato farming, hence a gap that demands specific studies to be carried out in order to fill it. The study's general objective was to determine the effect of the nature of messages conveyed between extension officers and farmers on the adoption of Irish potato farming. The target population for this descriptive study comprised farmers from four sub-locations (Kimbo, Gathuine, Kiamiogo, Mburugiti) of Kibirichia Ward in Meru County and all the three extension officers involved in the production of Irish potato crop. From the sampling frame, respondents were selected using purposive sampling. Farmers who took part in focus group discussions were selected using homogeneous sampling. Total population sampling method was used to take the total population of the three extension officers

that train Irish potato farmers in the four sub-locations in Kibirichia Ward. One focus group discussion and one in-depth interview were conducted from each sub-location in Kibirichia Ward. Using qualitative methods in data analysis, focus group and interview data was transcribed, coded and categorized into relevant themes and sub-themes and possible and plausible explanations of the findings drawn. Findings of this study revealed extension messages contained information, ideas and technologies on soil testing, seed varieties, spacing, weeding, earthing-up, pesticides, fertilizer and manure application, crop rotations, diseases and harvesting. Farmers' comprehension of most extension messages led to the high adoption of Irish potato farming in Kibirichia Ward. The researcher recommended that there is need to find the effect of the nature of messages conveyed between extension officers and farmers on the rate of adoption on Irish potato farming.

Keywords: Nature of Messages, Information, Ideas, Technology, Share Meaning, Adoption, Diffusion of Innovation Theory.

Introduction

In order to have effective communication with anyone, Birr (2012) asserts that both the sender and receiver of the message must be on the "same page," that is, they should understand or share the meaning of what has been communicated. To have an actual meaning of the ongoing conversation one has to understand or comprehend what is being said (message). A message is the information conveyed by the sender to the receiver (Oakley & Garforth, 1985). McLuhan however defines a "message" as, "the change of scale or pace or pattern" that an innovation "introduces into human affairs" (Federman, 2004). In agricultural communication, according to Aker (2011), message refers to the agricultural information or idea or technology that the source wishes to convey to the end-users (receivers).

Messages take various forms made up of several physical components, which may be words with symbolic meaning or ideas encoded into symbols to which meaning can be derived (Age, Obinne & Demenongu, 2012). Benokraitis (2016) asserts that language, most likely is the most powerful of all human symbols because it is a system of shared symbols that aid human beings to communicate with each other. Shared meaning is attained if the language and knowledge categories formed by the two communicating parties are understood by them (Tabatabai, 2009).

Messages are either verbal or nonverbal (DeVito, 2010). Verbal communication consists of spoken and written cues while nonverbal communication surpass written and spoken symbols (Gabbott & Hogg, 2001). Nonverbal communication is defined as the "unspoken dialogue" (Burgoon, Guerrero & Floyd, 2010). Steinberg (2007) asserted that the meaning attached to a message is from two types of information it carries: content and relational information. Content information refers to the details of the message while relational information is the feelings of the communicators and how the details of the message should be interpreted. DeVito (2015) however, notes that verbal messages can have two kinds of meanings. Connotation is subjective or emotional meaning that people have for words. Denotative meaning on the other hand is the definition of words as agreed upon by a group of people who speak a particular language or the way in which a dictionary defines a word. When the sender's message is appropriately interpreted, communication is said to be effective (Ergen, 2010).

The general extension approach uses trained extension specialists to provide a range of services to farmers that include technology transfers, advisory services and human resource development (Aker, 2011). Agricultural extension messages, according to Nisha (2006) and Lawal (2015) covers a wide range of information including improved varieties of crops, livestock control, water management and control of pests, weeds or plant diseases. Agricultural extension messages should be compatible with the existing practices, societal norms, beliefs and culture of the society before it can be accepted or adopted. A message that is relevant is one that is: technically feasible, economically affordable and socially acceptable by the people in the society (Age et al., 2012). FAO (2003) however argued that extension agents should communicate extension information in a language that the farmer is accustomed to. Kipkurui (2015) assessed the effects of information and communication on the use of organic resource inputs to build soil fertility in the central highlands of Kenya. Findings revealed that Kimeru and Kikuyu languages were used by government extension officers to disseminate information to farmers.

In regard to demand driven agricultural extension, Birner and Anderson (2007) pointed out that it is more responsive to the farmers' needs. Further, decentralization of agricultural extension services from the central to local government has helped farmers to express their demands for agricultural innovation. Bembridge (1991) was of the opinion that researchers need to know the needs of the farmers so as to be able to tailor appropriate messages for their use. In addition, extension officers are change agents who help farmers identify their farming problems and solutions (Anaeto et al., 2012). Through the identification of farmers information needs, extension officers are able to feed researchers with information on daily farming problems, successes and failures of farmers (Soola, 1988). Farmers are familiar with their problems and aspirations. Therefore, it is important for extension officers to involve them in the development of agricultural extension messages (Ofuoku, 2012).

There is a direct relationship between understanding of extension messages and adoption of agricultural technology by farmers (Ogueri, 2013). Farmers are usually not able to adopt new ideas because they are usually complex, technical and hardly understood (Anaeto et al., 2012). Oakley and Garforth (1985) note that agricultural extension officers may send messages which they feel are clear and concise but in the long run the receivers of the messages (farmers) end up interpreting them wrongly. It is the work of agricultural extension officers to collect, organize, interpret and clarify technical information related to farmers' different agricultural activities (Bagi & Bagi, 1989).

Campbell and Barker (1998) assert that the performance of extension programs to a large extent depends on the appropriateness of extension messages. Peshin, Vasanthakumar and Kalra (2009) also note that the impact of extension relies on communication of a relevant message through an understandable extension method. Extension messages turn out to be relevant to farmers when they are involved in the development and dissemination of information (Ofuoku, 2012). The extension officer should also view what he/she is doing or saying from the world view of his audience (Agbamu, 2006). Appropriate messages should be tailored to the farmers' context because a message that is suitable for one farmer may not be for another (Campbell & Barker, 1998). Oakley and Garforth (1985) noted that adoption and transfer of agricultural technology will not take place unless farmers share meaning with extension officers on messages transmitted through an appropriate feedback. Asking questions enhances farmers' comprehension of

messages. It reveals to the extension officers parts of messages farmers find difficult to understand (Hunt, 2006; Ofuoku, 2012).

In Kenya, Irish potato is an important food crop second to maize because of its high nutritional value and its adoption to a variety of production environments (Laititi, 2014). Potatoes are produced in the cool highlands mostly by small-scale farmers under rain-fed conditions. These areas include: Mt. Kenya region (Meru Central, Nyeri, Embu, Kirinyaga, Laikipia and Nyandarua), Aberdares and Eastern Rift Valley, Mau, Mt. Elgon and other highlands such as Taita Taveta (Kaguongo et al., 2008). The national production of Irish potatoes in Kenya is however far below the potential. FAO (2008) reports that in past years, the national average potato yields for Kenya was 9.5 tonnes per hectare but the figure has since then reduced to 7.5 tonnes per hectare. Low yields of Irish potatoes in Kenya have been attributed to failure to use clean seeds, under and over use of fertilizers, fungicides and lack of water for irrigation (Wang'ombe & Dijk, 2013). These do not include the nature of extension messages which could be a principle cause, hence a gap that demands specific studies to be carried out in order to fill it.

Therefore, this study investigated the effect of the nature of messages conveyed between extension officers and farmers on adoption of Irish potato farming in Meru County.

Theoretical Framework: Diffusion of Innovation Theory

Diffusion of innovation theory originated in the field of communication and was developed by Everett M. Rogers in 1962. Diffusion is the process in which a new idea is transmitted through certain media over a period of time to members of a social system. The theory states that the sources of a new idea (opinion leaders) should be unbiased, trustworthy to the adopters. The four main elements in the diffusion of new ideas are innovation, communication channels, time and social system.

An innovation is an idea, practice or object that is perceived as new by an individual(s) (Rogers, 2003). There are five qualities that determine the spread and adoption of an innovation: (1) Relative advantage which is the degree a social system perceives an innovation as better than the idea it supersedes, (2) Compatibility is the degree to which an innovation is perceived to be consistent with a social system's values, past experiences and needs, (3) Simplicity is the degree to which an innovation is perceived as easy to understand and use, (4) Triability which is the degree to which an innovation can easily be experimented with on a limited basis, and (5) Observability which is ease to see results of the innovation.

In regard to this theory, communication channels are the means through which messages are transmitted from the sender to the receiver (Rogers, 2003). Time is involved in the diffusion process in three ways. First, it is involved in innovation decision making which is a mental process. In the innovation-decision process an individual seeks information in five stages: Knowledge, persuasion, decision, implementation and confirmation. Second, time is involved in innovativeness. There are five categories of adopters who are members of a social system: Innovators (2.5%), early adopters (13.5%), early majority (34%), late majority (34%) and laggards (16%). Third, the rate of adoption which is the relative speed with which an innovation is adopted by members of a social system.

A social system is a set of interrelated units that are engaged is joint problem solving to accomplish a common goal. The structure of a social system can have an influence on the spread of an innovation. It can either deter or facilitate the rate of diffusion and adoption of innovations.

A social system also has norms, social statuses, hierarchy that influence people's behavior (Chi & Yamada, 2002). Similarly, Oakley and Garforh (1985) assert that in agricultural extension the adoption of new ideas involves farmers, groups of farmers or whole communities. Rogers asserts that the nature of social systems is either heterophily or homophily.

Methodology

Research Design

This study adopted the cross-sectional, qualitative descriptive design. This design takes place at a single point in time. Descriptive research attempts to describe, explain and interpret conditions and processes of the present and to examine a phenomenon that is occurring at a specific place and time (Kasomo, 2006). This research design was appropriate for the qualitative study on adoption of Irish potato farming in Kibirichia Ward because it was possible to ascertain the current level of adoption among farmers.

Instruments

The main data collection instruments for this study were one-on-one in-depth interview and focus group schedules. The one-on-one interviews entailed open-ended questions about the topic under study. Additionally they provided both the interviewer and interviewee the opportunity to discuss some topics in depth. The researcher prepared a list of open-ended questions to be covered during the FGD. The open-ended discussions required explanations, descriptions and narrations on shared meaning in the adoption of Irish potato farming.

Sampling Procedure

Focus group discussions respondents were purposively selected. Participating farmers were selected using homogeneous sampling, which is an approach of purposive sampling. The sub-chief of each location assisted in identifying nine farmers from their sub-location to be included in the focus group discussions. In-depth interviewees were selected using total population sampling which is also a technique of purposive sampling. Consequently, the research interviewed all the three Kibirichia Ward extension officers.

Data Collection Procedure

Data gathering was done through administration of interview schedules in one-on-one (O-O-O) interview with three key informants and interview guides in four Focus Group Discussion (FGDs) one in each sub-location of Kibirichia Ward, namely, Kimbo, Mburugiti, Kiamiogo and Gathuine. Before the interview sessions begun, the researcher informed the respondents about the study details and gave them assurance about ethical considerations, such as, confidentiality and anonymity. Permission was sort from the interviewee(s) to use a tape recorder. Respondents were asked identical open-ended questions in the same sequence without the interviewer influencing the process. At the end of the interview, the researcher thanked the respondents and ask them if there was any information that they wanted to add.

Results and Discussion

Demographic Information

Most of the farmers in this study ranged between 40-70 years of age while minority were between 20-30 years and one was 80 years old. Female farmers were more than the male in the Focus Group Discussions (FGD). Majority of the farmers had an experience of 10-19 years in Irish potato farming. Some women respondents claimed to have been born and brought up in other areas which did not cultivate Irish potatoes and were married in Kibirichia Ward where they practice Irish potato farming. Majority of the farmers had attained secondary education followed by those with primary education and a minority were either university graduates or had no formal education.

All the agricultural extension officers in Kibirichia Ward were in age brackets 52-54 years. Two of the officers were males while one was a female and they all had 8-10 years of working experience in Kibirichia Ward. All the extension officers were college graduates with two having attained a diploma while the third one had a Certificate in Agriculture.

Extension Messages Communicated

Farmers reported that a wide range of information was disseminated by extension officers on adoption of Irish potato farming. It included information on soil testing, seed varieties, spacing, weeding, earthing-up, pesticides, fertilizer and manure application, crop rotations, diseases and harvesting. Farmers further explained that they were often advised to do soil testing to determine the amount of various nutrients, alkalinity or acidity of their farm soil. This in turn helped in determining the kind and amount of fertilizers farmers would apply in their farms. *"Extension officers inform us that we should not cultivate one variety of Irish potato seed more than three consecutive times, since the yields will decrease,"* said one farmer. One of the FGD respondents also pointed out that they did not receive information on marketing from extension officers. The farmer said, *"Extension officers don't give us information on marketing. We get problems in getting reliable markets for Irish potatoes."*

Extension officers asserted that they primarily disseminate information on soil analysis, fertilizer application, crop rotation, seed acquisition and selection, pests and disease control to farmers. Information on farm records, harvesting, storage and marketing was also communicated. For instance, one of the extension officers said:

> *First, we teach them about seed selection. If they don't have good seeds, we inform them where they will source for seeds; mostly from Kisima Farm or groups of farmers that do seed multiplication. Once they get clean seeds, we make sure they have used the right fertilizers. These days, we emphasize on soil tests so that farmers can know the appropriate fertilizers to apply to specific types of soil. We also recommend the right pesticides because there are those who lose crops to early blight and late blight. Harvesting is also important; farmers must harvest Irish potatoes at the right time and keep them in good stores.*

Further, it was revealed that clean seed acquisition was highlighted as a major issue which was discussed because certified seeds are expensive.

This study indicates that a wide range of information on adoption of Irish potato farming from soil testing to marketing, were communicated to farmers. This finding partially supports previous research that agricultural extension messages, covers a wide range of information

including improved varieties of crops, livestock control, water management and control of pests, weeds or plant diseases (Nisha, 2006; Lawal, 2015). However, it was interesting to note that, whereas extension officers claimed to disseminate information on marketing, farmers asserted that they were not given such information. This discrepancy could be attributed to the top-down approach used by agricultural extension officers to pass information from research organizations and institutions to the farmers. In this approach, farmers received free extension messages but their information needs were not taken into consideration (Ponniah et al., 2008; WBOED, 1999).

Information Sought by Farmers

Farmers often sought for information on spacing, sowing of seeds, types of pesticides and fertilizers together with their use, crop rotation, use of organic manure and disease identification from extension officers. In addition, majority of the farmers said they requested for information on how to acquire high yielding Irish potato seeds. *"We would like to know if there are good Irish potato seeds that require little rainfall to produce high yields,"* said one of the farmers from Kiamiogo. A farmer from Kimbo said:

> *Some potato varieties take 120 days to mature while others take 90 days. Majority of us prefer to cultivate the quick maturing varieties that can be harvested within 90 days so that we can be able to plant other crops once we have harvested the potatoes; we would like to be given such information.*

When asked the same question as the farmers, one extension officer asserted that the most sought information was on seed varieties to be sown, crop diseases and market for the produce. Another extension officer stated that farmers often sought for information on all aspects of crop diseases and market for their produce. *"Farmers seek to know where they can sell their Irish potatoes at a good price when there is a lot of supply in the market,"* said the extension officer. Mix up of fertilizer use by farmers was another issue that was pointed out by the third extension officers who said:

> *Sometimes the farmers get mixed up with fertilizer application. This is because there are those who use fertilizers meant for other crops other than Irish potatoes. Some of them purchase any fertilizer that is cheap even if it is not meant for Irish potato farming. Some even buy different types of fertilizers which they mix and apply. Others, instead of using planting fertilizers, they apply top dressing fertilizers for planting. You know when they do that, they won't get good yields. So, there they get mixed up and ask us, 'I used this fertilizer. Why did I harvest low yields?' We point out the mistakes and remind them what they are supposed to do.*

This study revealed that farmers sought for a wide range of information on Irish potato farming from extension officers. This includes information on seeds, spacing, sowing, pesticides, fertilizers, crop rotation, organic manure and disease. These findings are in agreement with Bachhav (2012) who conducted a survey on information needs of the rural farmers in Maharashtra, India, and reported that majority of the farmers needed information on availability of seeds, crop production, water management, weather, agricultural equipment, insecticide and fertilizer availability. Similarly, Mittal and Tripathi (2009) in their study on the role of mobile phone technology in improving small farm productivity found that farmers required information on what to plant, seed varieties, weather, best practices for cultivation, prices, demand indicators and logistical details. Contrary to the farmers' responses, extension officers stated that farmers

frequently sought for information on seeds, diseases and market. This observation indicates that perhaps farmers perceived a wider range of information as key to getting high yields (Aker, 2011; Otter & Theuvsen, 2013) as compared to that of the extension officers who considered the three mentioned aspects to be special and all inclusive of those factors mentioned by the farmers.

Ability of the extension officers to provide information to farmers.

All farmers from the four groups were positive, about the ability of the extension officers to provide information sought from the officers. One farmer from Mburugiti said, *"When a new Irish potato variety has been produced in a farm, the officers rush there to get information which they later pass on to us."* Farmers also pointed out that the extension officers were knowledgeable about Irish potato farming and when they followed the officers' advice, they ended up getting high yields, *"They give us the required information and we are satisfied. We also believe that they are knowledgeable since they are the experts."*

All the extension officers reported that they were able to give farmers information on Irish potato farming. One of the extension officers said, *"I know a lot about Irish potatoes because I have cultivated them for many years. There is also a time I grew Irish potatoes in Timau for more than 12 years in partnership with various researchers on Irish potatoes."* However, concerning information that farmers sought on marketing, where and how they could get better prices for their produce, one of the extension officers said, *"I do usually advise them to form groups, marketing groups, so that buyers can come and buy in bulk from the groups. This will also give them bargaining power."*

Findings in this study revealed that the extension officers were able to give farmers the required information because they were knowledgeable and experienced in Irish potato farming processes. This finding is agreement with Aker (2011) and Ng'ang'a et al. (2013) who argued that the general extension approach uses trained extension specialists to provide a range of services to farmers that include technology transfers, advisory services and human resource development. Ofuoku (2012) in a study to determine the influence of extension agents' and farmers' communication factors on effectiveness of production technology messages found that extension officers were rated very good in terms of knowledge on innovations. For farmers to develop interest in extension information, Ofuoku further argued that extension officers should disseminate messages with truthfulness and sincerity. Extension officers are change agents who help farmers identify their farming problems and solutions (Anaeto et al., 2012).

Understanding of extension messages

On the question on whether adoption of Irish potato farming messages were understood or not, majority farmers indicated that they understood while a minority said they did not. For example, a farmer from Gathuine said, *"We understand what they teach us, therefore shared meaning takes place." "Shared meaning is there but sometimes we lack capital to practice what they teach us,"* said another farmer from Kiamiogo. The main indicator that farmers understood most information communicated to them was the high Irish potato yields obtained at the end of each cropping season. However, for lack of shared meaning which sometimes took place, this one farmer said, *"It is difficult to understand some English words referring to chemicals and diseases and this interferes with shared meaning. Information on soil acidity and fertilizers to improve acidic soil leaves some of us confused."*

Asked the same question, two of the three extension officers said that the farmers understood information disseminated to them thus shared meaning was achieved. For instance, one of the two officers said, *"If I teach 20 farmers and find that 12 or 13 of them have understood I generalize that the whole group has understood."* On the same note, the second extension officers said:

> *After conducting a demonstration session, we normally ask farmers questions on what we have taught and they are able to answer correctly. In addition, we also visit farmers' farms and we normally observe that they practice that which we have taught.*

Dissimilar to the two extension officers' views, the third extension officer pointed out that some farmers were unable to comprehend information disseminated to them because they were passive participants who did not practice what they were taught.

Findings of this study revealed that majority of the farmers understood information disseminated to them by extension officers on adoption of Irish potato farming, thus creating shared meaning. This agrees with Birr (2012) who asserted that in order to have effective communication with anyone, both the sender and receiver of the message must be on the "same page," that is, they should understand or share the meaning of what has been communicated. Farmers ability to understand could be attributed to use of language(s) that the farmer is accustomed to (FAO, 2003), and dissemination of technically feasible, economically affordable and socially acceptable extension messages (Age et al., 2012). Further, Bagi and Bagi (1989) asserted that it is the work of agricultural extension officers to collect, organize, interpret and clarify technical information related to farmers' different agricultural activities. However, this study revealed that a few farmers sometimes didn't understand extension messages. This could be attributed to farmers inability to understand complex and technical new ideas which in turn leads to low adoption of innovations (Anaeto et al., 2012; Ogueri, 2013).

Extension Messages that Farmers Faced Difficulties in Understanding

Majority of the farmers had difficulties in understanding information on soil analysis, fertilizers, pesticides and diseases. *"Most of the farmers are unable to comprehend when told that their farm soil is acidic. There is also no name for acidity in Kimeru,"* said one farmer from Kiamiogo. In addition, farmers had difficulty in understanding information on the amount and type of fertilizers to use at different stages of crop growth. Different companies also used different labeling names for the same brand of pesticides thus confusing farmers. A farmer from Kimbo said, *"Through spoken messages extension officers tell us that Ridomile should be applied in a certain way but pesticide instructions on the packaging instruct differently." "We also have difficulty in understanding information of Irish potato crop diseases. Sometimes different diseases have similar symptoms and we are unable to distinguish some crop diseases,"* said another farmer from Gathuine.

The extension officers reported that farmers had difficulty in understanding information on soil analysis, storage and marketing of produce. Two of the extension officers asserted that marketing was an area which farmers had difficulty in understanding. One of them said:

> *For the last 20 years I have worked with Irish potato farmers, they do not comprehend the marketing aspect. They don't understand when I tell them that they are the major decision makers in setting the prices for Irish potatoes in the market.*

On the same note, another extension officer explained, *"The other challenge with marketing is that brokers or middle men get involved making farmers loose heavily to them. The market has also become a challenge because farmers sometimes sell their produce at a lower price than anticipated."* Further, the officer went on to say, *"Storage is normally a problem because many farmers cannot afford to build a good store. Some farmers put their yields outside, cover them with dry leaves but later on they end up getting scorched by the sun."*

This study revealed that farmers faced difficulties in understanding some technical information on Irish potato farming. Anaeto et al. (2012) corroborated this finding by asserting that farmers are usually not able to adopt new ideas because they are usually complex, technical and hardly understood. Farmers' difficulty in understanding some of the messages on Irish potato farming could be as a result of misinterpretation of extension messages as argued by (Oakley & Garforth, 1985). Farmers in this study expressed having difficulties in understanding information on soils analysis, fertilizers, pesticides and diseases. Extension officers on the other hand reported that farmers had problems with marketing and storage of Irish potatoes, apart from understanding information on soil analysis. The discrepancy between the farmers and officers responses could be as a result of farmers having viewed crop cultivation process information as technical as compared to that of post-harvest information. Oakley and Garforth (1985) noted that agricultural extension officers may send messages that they view as clear and concise but in the long run the receivers of the messages (farmers) end up interpreting them wrongly. For farmers to understand agricultural messages, FAO (2003) argued that extension agents should communicate extension information in a language that the farmer is accustomed to.

Adoption of Irish Potato Farming

Majority of the farmers from the four sub-locations asserted that there was increased adoption. For example, a farmer from Kiamiogo said, *"We have to keep up with change and technology."* A Mburugiti farmer reported, *"Adoption has increased because different varieties of Irish potatoes are planted all the time,"* while a farmer from Kimbo who was of a different opinion said, *"It is moderate. It is neither low nor high; it is in the middle."* This view was justified by another farmer who said, *"We adopt but not all of us are quick in adopting. Only few farmers are fast in adopting and the rest of us wait and see how those who have adopted are faring on."*

Asked the same question, all the extension officers noted that there was increased adoption of Irish potato farming. One extension officer, for example, said, *"It has increased because we teach farmers new information which they pay attention to and adopt."* In addition, another extension officer said:

> *Actually, the production has really increased because we have taught them good agricultural practices. We have taught them to use certified seeds from Kisima Farm. We have also taught them how to space seeds during planting because spacing was initially a problem. We have been teaching them about crop rotation, pests and diseases control.* (Sic)

According to this study there was an increase in the adoption of Irish potato farming in Kibirichia Ward. This finding contradicts Muthoni and Nyamongo (2009) and Nyagaka et al. (2009) argument that despite numerous efforts and resources dedicated to the creation and diffusion of new Irish potato production technologies, the average farm production has not yet increased.

The increase in adoption of Irish potato farming could be attributed to the fact that Irish potatoes are an important source of food, employment and income in developing countries (FAO, 2008; Kabungo, 2008).

Effect of the nature of messages on adoption of Irish potato farming

Majority of the farmers from the four sub-locations reported that there was increased adoption. For example, a farmer from Kiamiogo said, *"We adopt because we understand extension messages."* A Mburugiti farmer reported, *"Extension officers encourage us to ask questions in areas that we have not understood and it encourages us to adopt Irish potato innovations.*

All the extension officers noted that there was increased adoption of Irish potato farming. One extension officer, for example, said, *"It has increased because we teach farmers new ideas which they pay attention to and adopt."* In addition, another extension officer said, *"Adoption has increased because we are usually keen to ensure that all farmers understand the information we give them."*

According to this study, the nature of extension messages led to an increase in the adoption of Irish potato farming in Kibirichia Ward. These findings concur with Oakley and Garforth (1985), Ogueri (2003) and Onasanya et al. (2006) who argued that there is a direct relationship between understanding of extension messages and adoption of agricultural technology by farmers. Farmers are usually not able to adopt new ideas because they are usually complex, technical and hardly understood (Anaeto et al., 2012). It is the work of agricultural extension officers to collect, organize, interpret and clarify technical information related to farmers' different agricultural activities (Bagi & Bagi, 1989).

Conclusion

The extension messages contained information, ideas and technologies on soil testing, seed varieties, spacing, weeding, earthing-up, pesticides, fertilizer and manure application, crop rotations, diseases and harvesting. In addition, extension officers were able to give farmers the required information because they were knowledgeable and experienced in Irish potato farming processes. Farmers were keen to understand messages and adhere to extension officers' advice in order to maximize production. Farmers' comprehension of most extension messages led to the high adoption of Irish potato farming in Kibirichia Ward.

Implication of the Study

Drawing from the conclusions, this paper observes that to attain a hundred percent adoption of Irish potato farming, agricultural extension officers should enlighten all farmers on the benefits of forming extension groups and encourage them to join. Further, the extension officer should make sure that groups consist of farmers who share the same interests and problems. Groups create a supportive environment to individual farmers enabling them get extension messages, make decisions and determine a course of action. The group method of extension also enable extension officers to achieve greater coverage in less time and cost.

References

Agbamu, J. U. (2006). *Essentials of agricultural communication in Nigeria*. Lagos: Malthouse

Press Ltd.

Age, A. I., Obinne, C. P. O., & Demenongu, T. S. (2012). Communication for sustainable rural and agricultural development in Benue State, Nigeria. *Sustainable Agriculture Research*, *1*(1), 118–129. https://doi.org/10.5539/sar.v1n1p118

Aker, J. C. (2011). Dial "A" for agriculture: A review of information and communication technologies for agricultural extension in developing countries. *Agricultural Economics*, *42*(6), 631–647. https://doi.org/10.1111/j.1574-0862.2011.00545.x

Anaeto, F. C., Asiabaka, C. C., Nnadi, F. N., Ajaero, J. O., Aja, O. O., Ugwoke, F. O., Ukpongson, M. U., & Onweagba, A. E. (2012). The role of extension officers and extension services in the development of agriculture in Nigeria. *Wudpecker Journal of Agricultural Research*, *1*(6), 180–185. Retrieved from http://pdoaj.com/pdf-files/agr/194/180-185 Vol 1 issue 6 July 2012.pdf

Bachhav, N. B. (2012). Information needs of the rural farmers: A study from Maharashtra, India: A survey. *Library Philosophy and Practice*, *866*. Retrieved from http://digitalcommons.unl.edu/libphilprac/866 [Accessed July 20, 2013].

Bagi, F. S., & Bagi, S. K. (1989). A model of farm-level demand for extension information. *North Central Journal of Agricultural Economics*, *11*(2), 297–307.

Bembridge, T. J. (1991). *The practice of agricultural extension: A training manual.* Development Bank of Southern Africa: Halfway House.

Benokraitis, N. V. (2016). *Introduction to Sociology.* (4th ed.). Boston, MA: Cengage Learning.

Birner, R., & Anderson, J. R. (2007). How to make agricultural extension demand-driven? The Case of India's agricultural extension policy. *IFPRI Discussion Paper 00729*, (November).

Birr, T. (2012). Communication: The process of creating shared meaning. Retrieved from https://thefoxyfiveexplainsitall.wordpress.com/2012/09/14/communicationthe-process-of-creating-shared-meaning/

Burgoon, J. K., Guerrero, L. K., & Floyd, K. (2010). *Nonverbal communication*. New York: Pearson Education Inc.

Campbell, D. A., & Barker, C. (1998). Selecting appropriate content and methods in programme delivery. In B. E. Swanson, R. P. Bentz, & A. J. Sofranko (Eds.), *Improving agricultural extension. A reference manual* (2nd ed.). Rome.

Chi, T., & Yamada, R. (2002). Factors affecting farmers' adoption of technologies in farming system: A case study in Omon district, Can Tho province, Mekong Delta. *Omonrice*, *10*, 94–100. Retrieved from https://pdfs.semanticscholar.org/f62f/b7147568c61610d4ad6b6de48f14a73f6f83.pdf

DeVito, J. A. (2010). *Essentials of Human communication* (7th ed.). New York: Person Education.

DeVito, J. A. (2015). *Human communication: The basic course* (13th ed.). Harlow: Pearson Education Limited.

Ergen, E. (2010). *Workplace Communication : A case study on informal communication network within an organization,* (November), 1–14. Retrieved from http://www.ergen.gr/files/WorkplaceCommunicationInformalCommunicationFramework.pdf

FAO. (2003). *Addressing extension and training needs of farmers with physical disabilities: A case study of the Islamic Republic of Iran*. Rome. Retrieved from http://www.fao.org/tempref/GI/Reserved/FTP_FaoRlc/old/prior/desrural/extension/pdf/ir

an1.pdf

FAO. (2008). *International year of the potato 2008: New light on a hidden treasure.* Rome. Retrieved from http://www.fao.org/potato-2008/pdf/IYPbook-en.pdf

Federman, M. (2004). What is the Meaning of the Medium is the Message? Retrieved from http://individual.utoronto.ca/markfederman/article_mediumisthemessage.htm

Gabbott, M., & Hogg, G. (2001). The role of nonverbal communication in service encounters: A conceptual framework. *Journal of Marketing and Management*, *17*(1–2), 5–26. https://doi.org/10.1362/026725701257140

Hunt, J. U. (2006). *Defining effective message.* Technical Assistance Bulletin. Washington. D.C. Centre for Sustainable Agricultural Policy (CSAP).

Kabungo, C. V. D. (2008). *Evaluation of Irish potato production and marketing performance: A case study of Mbeya rural district, Mbeya region, Tanzania* (Master's thesis, Sokoine University of Agriculture). Retrieved from http://suaire.suanet.ac.tz:8080/xmlui/bitstream/handle/123456789/122/CATHERINE V. D. KABUNGO 2008.pdf?sequence=1&isAllowed=y

Kasomo, D. (2006). *Research methods in humanities and education*. Eldoret: LAP Lambert Academic Publishing.

Kipkurui, W. (2015). *Assessing the effects of information and communication on the use of organic resource inputs to build soil fertility in the Central Highlands of Kenya* (Master's thesis). Retrieved from https://journalism.uonbi.ac.ke/sites/default/files/chss/journalism/journalism/M.A. PROJECT - LANGAT, WALTER KIPKURUI.pdf

Laititi, M. S. (2014). Potato market survey in Kenya: An agricultural product value chain approach. *International Journal of Business and Management Review*, *2*(6), 59-87. Retrieved from http://www.eajournals.org/wp-content/uploads/Potato-Market-Survey-In-Kenya-An-Agricultural-Product-Value-Chain-Approach.pdf

Lawal, O. A. (2015). Indigenous languages as tools for effective communication of science and technology for food production in Nigeria. *Theory and practice in language studies, 5*(3), 463-468. Retrieved from file:///C:/Users/comp12/AppData/Local/Temp/126-487-1-PB.pdf

Mittal, S. & Tripathi, G. (2009). Role of mobile phone technology in improving small farm productivity. *Agricultural Economics Research Review, 22, 451-459.* Retrieved from *https://ageconsearch.umn.edu/bitstream/57502/2/15-S-Mittal.pdf*

Muthoni, J., & Nyamongo, D. O. (2009). A review of constraints to ware Irish potatoes production in Kenya. *Journal of Horticulture and Forestry*, *1*(7), 98–102. Retrieved from http://www.academicjournals.org/article/article1379686338_Muthoni and Nyamongo.pdf

Ng'ang'a, N. M., Kinyae, P. M., Walingo, A., Wakahiu, M. W., Kipkoech, D., Muhonja, L., & Kabira, J. N. (2003). Potato production and technology dissemination in Kenya. Unpublished Report

Nisha, M. (2006). *Understanding extension education*. Delhi: Kalpaz Publication.

Nyagaka, D. O., Obare, G. A., & Nguyo, W. (2009). *Economic efficiency of smallholder Irish potato producers in Kenya : A case of Nyandarua North District.* Paper presented at the International Association of Agricultural Economists' Conference, 16 to 22 August 2009, Beijing, China. Retrieved from http://ageconsearch.umn.edu/bitstream/49917/2/CCONTRIBUTED_PAPER_98.pdf

Oakley, P., & Garforth, C. (1985). *Guide to extension training*. Rome: Food and Agriculture Organization of the United Nations. Retrieved from http://www.fao.org/3/a-t0060e.pdf

Ofuoku, A. U. (2012). Influence of extension agents' and farmers' communications factors on the effectiveness poultry technology messages. *Tropical Agricultural Research & Extension*, *15*(1). Retrieved from https://www.google.com/#q=Ofuoku,+A.+U.+(2012).+INFLUENCE+OF+EXTENSION+AGENTS'+AND+FARMERS'+COMMUNICATIONS+FACTORS+ON+THE+EFFECTIVENESS+POULTRY+TECHNOLOGY+MESSAGES.+Tropical+Agricultural+Research+&+Extension+15(1):+2012

Ogueri, E. I. (2013). Evaluation of agricultural extension messages that support adoption of improved cassava production technologies: A case of public and private sector extension in Rivers State, Nigeria. *International Journal of Sustainable Development*, *6*(4), 11–24. Retrieved from http://www.ssrn.com/link/OIDA-Intl-Journal-Sustainable-Dev.html

Onasanya, A. S., Adedoyin, S. F., & Onasanya, O. A. (2006). Communication factors affecting the adoption of innovation at the grassroots level in Ogun State , Nigeria. *Journal of Central European Agriculture*, *7*(4), 601–608. Retrieved from file:///C:/Users/comp12/AppData/Local/Temp/jcea74_1.pdf

Otter, V., & Theuvsen, L. (2013). *ICT and farm productivity: Evidence from the Chilean agricultural export sector.*Contributed paper accepted for poster presentation at the 34. GIL-Jahrestagung – IT-Standards in der Agrar- und Ernährungswirtschaft. Bonn, Germany, February 24-25, 2014.

Peshin, R., Vasanthakumar, J., & Kalra, R. (2009). Diffusion of innovation theory and integrated pest management. In Peshin, R. & Dhawan, A. (Eds.) Vol 2. *Integrated Pest Management: Dissemination and Impact*. Springer, Dordrecht, 1–29. Retrieved from http://gtu.ge/Agro-Lib/Books/Integrated_Pest.pdf

Ponniah, A., Puskur, R., Workneh, S. & Hoekstra, D. (2008). *Concepts and practices in agricultural extension in developing countries: A source book*. Ethiopia: International Livestock Research Institute. Retrieved from https://cgspace.cgiar.org/bitstream/handle/10568/99/Source_book.pdf

Rogers, E. M. (2003). *Diffusion of innovation* (5th ed.). New York: The Free Press.

Soola, E. (1988). Agricultural communication and the African non-literate farmer: The Nigerian experience. *Africa Media Review*, *2*(3), 75–91. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/12342253%5Cnhttp://archive.lib.msu.edu/DMC/African Journals/pdfs/africa media review/vol2no3/jamr002003006.pdf

Steinberg, S. L. (2007). *An introduction to communication studies*. Cape Town: Juta & Co. Ltd.

Tabatabai, M. R. (2009). *The process of communication between people with categorical knowledge: An exploratory study* (Master's thesis). Retrieved from https://uwspace.uwaterloo.ca/bitstream/handle/10012/4764/Thesis submission-Rohani.pdf?sequence=1&isAllowed=y

Wang'ombe, J. G., & Dijk, M. P. (2013). Low potato yields in Kenya: Do conventional input innovations account for the yields disparity? *Agriculture & Food Security*, *2*(14). https://doi.org/10.1186/2048-7010-2-14

World Bank Operations Evaluation Department (WBOED). (1999). *Agricultural extension: The Kenya experience.* Pre'cisWinter 1999, No 198i. Retrieved from http://lnweb90.worldbank.org/oed/oeddoclib.nsf/docunidviewforjavasearch/b728d887fc

2b754d852568bd005a8c19/$file/198precis.pdf