

Efficacy of Interpersonal Communication Channels in the Diffusion and Adoption of Zero Grazing Technology

Sammy Cheboi

Department of Media Technology and Applied Communication, School of Mass Communication and Development Studies, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya.
Email: samcheboi@gmail.com

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Abstract

This study was an investigation of the effectiveness of interpersonal communication channels in aiding diffusion and adoption of zero grazing innovation in Tot Division, Kenya. The problem of this study was that past innovation-diffusion studies have had limited focus on the importance of interpersonal communication channels on diffusion and adoption of zero grazing as an agricultural technology, hence a gap that demands specific studies are undertaken to fill it. The study's general objective was to explain the efficacy of interpersonal communication in the diffusion and adoption of zero grazing. The target population for this descriptive study was dairy farmers in Tot Division. The descriptive research design adopted insulated the variables from manipulation. The study sample comprised of participants for five Focus Group Discussions (FGDs) and one Key Informant Interview (KII) in five locations. Purposive sampling was based on those informants who are informative, experienced, and analytical, and had been recommended by multiple sources, with each focus group having eight participants. The key data collection instruments were interview guide for FGDs and interview schedule for KII. Data analysis has been based on qualitative methods such as content analysis, discourse analysis, and interpretive techniques. Although interpersonal communication channels were widely used in the study area, the researcher recommends further studies to establish the role of mass media in augmenting interpersonal channels of communication in the diffusion and adoption of agricultural innovations, particularly in communities with lower penetration level of mass media.

Key words: zero grazing, diffusion, adoption, innovation, diffusion theory, social systems, networks, interpersonal communication

Introduction

Agriculture underpins the livelihoods of over two thirds of Africa's poor and assumes even greater importance in the continent's poorer countries. Unfortunately, agricultural productivity especially in sub Saharan Africa has been stagnating for many years, observe Adekunle, Ellis-Jones, Ajibefun, Nyikal, Bangali, Fatunbi and Ange (2012). They add that although agricultural research has generated many technologies with the potential to address this situation, their impact on productivity, livelihoods and quality of life has been disappointing due to poor uptake of agricultural innovations. An exception to this state of affairs is the dairy sub-sector which has seen such innovations as zero grazing gain traction in Kenya. The evolution of the dairy industry in Kenya has seen an increase in milk production, from 2.8 billion litres in 2002 to 4.2 billion in 2009 aided in part by widespread rearing of improved breeds and technology-driven animal husbandry (Ministry of Agriculture, 2010). This is a pointer to the increasing levels of innovation diffusion and adoption by the farming community.

The diffusion of innovations was developed by James Coleman in late 1960s who investigated how doctors decided to adopt new antibiotic drugs (Jowett and O'Donnell (2006). It was found that peer networks influenced doctors more than scientific evaluations by university medical schools and pharmaceutical firms. Jowett and O'Donnell contend that persuasion has the effect, when it is successful; of resulting in a reaction such as "I never saw it that way before." What happens is that the recipient of the persuasive interaction relates to, or contrasts the message with his or her existing repertoire of information, experiences, or both. The diffusion process, according to Jowett and O'Donnell, occurs through a combination of mass and interpersonal communication and often took years until an idea had spread. It is a complex process that begins with the people involved who exist within a system. First, their variables, including personality, social characteristics, and needs, are examined. Next, the social system itself has to be looked at in terms of its variables. Third, the characteristics of the innovation are analysed.

Communication channels can be categorized as localite channels and cosmopolite channels that communicate between an individual of the social system and outside sources. While interpersonal channels can be local or cosmopolite, almost all mass media channels are cosmopolite. Because of these communication channels' characteristics, mass media channels and cosmopolite channels are more significant at the knowledge stage and localite channels and interpersonal channels are more important at the persuasion stage of the innovation-decision process (Rogers, 2003). Juma (2011) argues that agricultural technology should preferably be developed with active farmers' participation and understanding of the application of new technologies.

Thus, the study investigated the way in which information about the zero grazing innovation has been transferred through interpersonal communication channels and their influence on Tot Division (Marakwet East Sub-County of Elgeyo Marakwet County, Kenya) farmers' decisions to adopt the innovation.

Theoretical Framework: Diffusion of Innovation Model

The framework that was applied to this study was made up of Diffusion of Innovation Model, Individual Innovativeness Theory, Theory of Perceived Attributes, Two-Step Flow Theory, Social Learning Theory, and Media Richness Theory. However, it is Rogers' (1995) Diffusion of Innovation theory that is predominantly applied. It is widely used as a theoretical framework in the area of technology diffusion and adoption. Diffusion theory is not one single theory but several theoretical perspectives that are used to explain different innovation adoption

strategies. For the purposes of this study, two of the four major theories were appropriate: the individual innovativeness theory and the theory of perceived attributes (Rogers 2003).

Rogers (2003) described the innovation-decision process as “an information-seeking and information-processing activity, where an individual is motivated to reduce uncertainty about the advantages and disadvantages of an innovation” (p. 172). For Rogers, the innovation-decision process involves five steps: knowledge, persuasion, decision, implementation, and confirmation. These stages typically follow each other in a time-ordered manner as shown in the figure above.

The innovation-decision process starts with the knowledge stage during which an individual learns about the existence of innovation and seeks information about the innovation. “What?” “How?” and “why?” are the critical questions in the knowledge phase. During this phase, the individual attempts to determine “what the innovation is and how and why it works” (Rogers, 2003, p. 21). According to Rogers, the questions form three types of knowledge: awareness-knowledge, how-to-knowledge, and principles-knowledge.

The persuasion step occurs when the individual has a negative or positive attitude toward the innovation, but the formation of a favorable or unfavorable attitude toward an innovation does not always lead directly or indirectly to an adoption or rejection. The individual shapes his or her attitude after he or she knows about the innovation. Furthermore, Rogers states that while the knowledge stage is more cognitive-(or knowing-) centered, the persuasion stage is more affective-(or feeling-) centered. Thus, the individual is involved more sensitively with the innovation at the persuasion stage. The degree of uncertainty about the innovation’s functioning and the social reinforcement from others (colleagues, peers, etc.) affect the individual’s opinions and beliefs about the innovation.

At the decision stage in the innovation-decision process, the individual chooses to adopt or reject the innovation. If an innovation has a partial trial basis, it is usually adopted more quickly, since most individuals first want to try the innovation in their own situation and then come to an adoption decision. The vicarious trial can speed up the innovation-decision process. However, rejection is possible in every stage of the innovation-decision process. Rogers expressed two types of rejection: active rejection and passive rejection. In an active rejection situation, an individual tries an innovation and thinks about adopting it, but later he or she decides not to adopt it. A discontinuance decision, which is to reject an innovation after adopting it earlier, may be considered as an active type of rejection. In a passive rejection (or non-adoption) position, the individual does not think about adopting the innovation at all. During the implementation stage, an innovation is put into practice. However, uncertainty about the outcomes of the innovation still can be a problem at this stage. Thus, the implementer may need technical assistance from change agents and others to reduce the degree of uncertainty about the consequences and thus enhance its chances of adoption.

The final stage in the innovation-decision process is the confirmation of the decision already made to adopt or reject an innovation. The individual looks for support for his or her decision. According to Rogers (2003), this decision can be reversed if the individual is “exposed to conflicting messages about the innovation” (p. 189). However, the individual tends to stay away from these messages and seeks supportive messages that confirm his or her decision. Thus, attitudes become more crucial at the confirmation stage. Depending on the support for adoption of the innovation and the attitude of the individual, later adoption or discontinuance happens during this stage. Therefore, the interpersonal channels used can fast track or slow down the innovation-decision process.

This model predicts that media as well as interpersonal contacts provide information and influence opinion and judgment. Rogers (1995) observed that information flows through networks and the nature of networks and the roles opinion leaders play in them determine the likelihood that the innovation will be adopted. Opinion leaders exert influence on audience behavior via their personal contact, but additional intermediaries called change agents and gatekeepers are also included in the process of diffusion. The efficacy of these interpersonal channels in the innovation-diffusion process was the subject of this study.

Methodology:

Research Design

This study adopted a descriptive research design. This design is suitable where the study seeks to describe and portray characteristics of an event, situation, or a population and it will also enable the researcher to profile the sample or population by gathering accurate information (Burton, 2000). This design was appropriate for the qualitative study of zero grazing adoption in Tot because it was possible to ascertain the current level of adoption among farmers and the potential for further adoption.

Instruments

The main data collection instruments for this study were interview schedule and interview guide containing open-ended questions to identify, analyse and describe the impact of interpersonal communication channels on the diffusion and adoption of zero grazing in Tot. Appropriate follow up questions supplemented the data collection. The interview guide for the focus group discussions with dairy farmers and interview schedule for key informant interview were developed and administered.

Sampling Procedure

Purposive sampling (non-probability) technique was used in selecting participants for the FGDs and Key Informant Interviews. This is because the division has traditionally practiced free range system of dairy farming but today zero grazing has been embraced. The farmers had similar features, hence purposive as a non-probability sampling was appropriate because it provided reliable and robust data (Onwuegbuzie, Dickinson, Leech, and Zoran, 2009). Forty of them; eight in each of the five Focus Group Discussions, were selected and interviewed. Seventeen key informants (ten opinion leaders, one livestock officer and the only six NGOs representatives who have training in general agriculture) were purposively selected for their specialized knowledge and unique perspectives on the topic. Those informants with various points of view were selected. To achieve this, the researcher identified the groups and organizations from which a few select key informants should be drawn—for example, host government agencies, project implementing agencies, contractors, beneficiaries. All major stakeholders were included so that divergent interests and perceptions were captured.

Data Collection Procedure

Data gathering was done through administration of interview schedule in one Key Informant Interview (KII) (face-to-face, note-taking) and interview guide in five Focus Group Discussions (FGDs), one in each of the five locations of Tot Division, namely; Kaben, Endo, Koibirir, Mokoro and Murkutwo. Forty dairy farmers and 17 experts, opinion leaders and representatives of NGOs were interviewed between February 24 and March 1, 2014, with each FGD lasting two hours and the key informant interview lasting two and a half hours. Usually between 3 and 5 focus groups are sufficient to gain the diversity of views towards saturation, without the possibility of repetition of ideas, according to Onwuegbuzie et al (2009). The researcher led the FGDs by asking questions and follow up questions, ensuring that each participant had an

opportunity to contribute. The study sought answers to three core questions: Which interpersonal communication channels were used in the promotion of zero grazing technology in Tot? What factors influenced the choice of the interpersonal channels applied in the adoption of zero grazing? and what were the contributions of the interpersonal channels in the zero grazing innovation-decision process? Data in form of notes was captured with help from an assistant researcher.

The research design for this study was executed in three stages. First, interview guide (containing open-ended questions) for FGDs and interview schedule for KII were developed. The second stage involved conducting five FGDs; one in each location. Third, one KII with one livestock extension officer, ten key opinion leaders and six non-profit organizations' representatives was conducted. In both FGDs and KII, further probing was done to get in-depth understanding of farmers' decisions to adopt the zero grazing innovation.

Results and Discussion

General demographics information

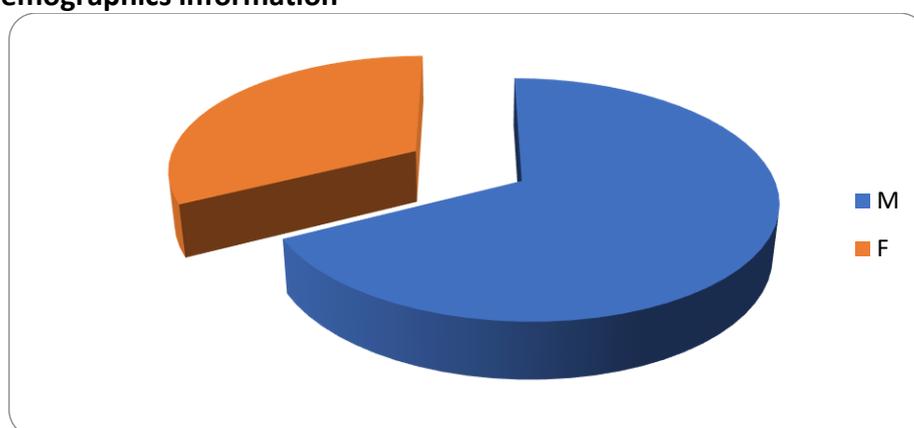


Figure 1: Gender composition of adopters

Respondents for the study comprised both men and women of diverse ages, making it possible to collect primary data that is representative of the entire farming communities of Tot division. With similar features, the farmers were purposively sampled and interviewed, yielding reliable and robust qualitative data. Forty of them; eight in each of the five FGDs, were selected and interviewed. Twenty seven were male and 13 were women farmers, representing 67.5 % and 32.5 %, respectively (Figure 1). Seventeen key informants comprising of ten opinion leaders, one livestock officer and six NGOs representatives were purposively selected for their specialized knowledge and unique perspectives on the topic. Twelve were men and five women. The gender gap in the adoption of zero grazing can be explained by the traditional place of women in livestock ownership but with the passage of time that brings with it liberalism, this gap is bound to lessen or even disappear. Overall, male respondents were 39 while female were 18, representing 68.4% and 31.6%, respectively (Table 1).

The ages of adopters were found to have had a significant role in their adoption decisions. The forty farmers were grouped into four age groups, with their sum group characteristics and attitude towards the new innovation and its ultimate adoption being similar. The age groups were; 21-35 years (9 respondents), 36-45 (15 respondents), 46-59 (11 respondents), and 60 (5 respondents) and above. Their respective percentage composition is presented in Table 1.

		Respondents/adopters	Percentage
Gender	Male	39	68.4%

Age	Female	18	31.6%
	21-35	9	22.5%
	36-45	15	37.5%
	46-59	11	27.5%
	60 and above	5	12.5%

Table 1: Demographic profile of the respondents/adopters

The uptake of the zero grazing technology differed based on age groups. Majority of the adopters (15) fall within the age bracket 36-45 and this could be attributed to the fact that majority of them are economically capable of implementing the project; are mostly educated and widely travelled. Age was also a factor in terms of gender representation of adoptees across the four age groups. All women adopters fall within the first two age groups, perhaps explained by the liberal nature of their respective spouses and the emergent concept of self-help groups which has been embraced by the two age groups. From this data, it is evident that the youth and the middle-aged are the majority adopters (24), hence a key influence on the successful diffusion and adoption of zero grazing in Tot. The two groups comprise of individuals who are outgoing and are not afraid to try out new ideas and technologies, hence early adoption whereas the elderly farmers were found to have been generally suspicious, hence late adoption. On account of age, it is evident that adoption declined among the older farmers, partly due to their unwillingness to try out, high regard for the age-old free range system and lower economic ability to invest in the new technology.

Indeed, the Kenyan government has been alarmed by the ageing population of her farmers, a situation that spells doom in the face of their apparent resistance to change, especially as pertains to agricultural technologies that modern agriculture is increasingly reliant on. In Agricultural Sector Development Strategy (2010), it states bleakly that the average age of the Kenyan farmer is 60 years, and yet the vast percentage of the population is under 35. Further, the situation is made worse by the fact that the youth are neglecting agriculture in a big way, and if this trend continues, the agricultural sector will experience a decline in the years to come, and the country will continue to struggle with high unemployment among the youth. The findings of this study in respect of age are strongly corroborated by Cyphers, D'Souza and Phipps (1993) who argue that age is likely to be negatively associated with adoption; younger farmers are more likely to adopt new technologies and/or are more likely to be early adopters.

Results of the Study

The data obtained from the field study is hereby presented on the basis of the study's three objectives, namely; to describe the interpersonal communication channels used in the promotion of zero grazing technology in Tot; to analyse factors that influenced choice of the interpersonal channels applied in the adoption of zero grazing in Tot; and to describe the contributions of the interpersonal channels in the zero grazing innovation-decision process.

Description of Interpersonal Communication Channels used in the Diffusion and Adoption of Zero Grazing in Tot Division

Data from the five focus group discussions and the key informant interview reveal that the key interpersonal channels cited by respondents as having been central to their innovation adoption decisions include opinion leaders, churches, family members, peers, field demonstrations, farmers' field days in schools, co-farmers/early adopters and non-state agencies' farms, women and youth group meetings, public barasas, provincial administrators and experts such as livestock production officers and development agencies like World Vision, Child Fund, and Catholic Justice and Peace Commission (CJPC).

It is also evident that interpersonal communications between experts and the public, opinion leaders and the public and among friends and family members were essential in bringing about the adoption of zero grazing. Knowing the viewpoints of close referent others (e.g. family and friends) and opinion leaders was a critical element of the social comparison process leading to choice shift from traditional cattle keeping to zero grazing. Most of the respondents disclosed that they relied on more than one interpersonal channel of communication in making their decision to adopt zero-grazing. The respondents said their exposure to these channels was frequent as they were easily accessible in their locality. They cited accessibility, cost, availability and frequent meetings with opinion leaders, promoters of the innovation and women and youth group meetings as factors that influenced their choices of interpersonal communication channels.

The respondents also acknowledged the role played by the church in the dissemination of information. This was because during the conflict between Marakwet and Pokot communities, the Catholic Justice and Peace Commission advocated for zero-grazing as an alternative to the high risk free range system of livestock keeping. The study found marked differences in the patterns of information seeking among the farmers. Generally, respondents said they preferred interpersonal networks of family and friends, as information sources. But there was also a preference for NGOs among those in Murkutwo and Koibirir locations due to the presence of World Vision, Child Fund and Catholic Justice and Peace Commission. The church was also cited as a trusted source of information across the division.

The messages in the interpersonal channels were found to be responsive to farmers' needs such as disclosure of the existence of an acceptable risk in adopting the innovation; they were presented in a form respectful of the worldview of the beneficiaries, communicated a solution to farmers' frustrations at declining productivity and the ever present risk of losing one's herd to cattle rustlers, and the messages were locally adapted. As informal interpersonal communication sources, opinion leaders were found to be remarkably effective at influencing farmers in their adoption decisions. Respondents thought of them as highly credible sources of information because they were perceived as objective concerning the advice they offered to farmers who were wrestling with the decision of whether to adopt or reject the zero grazing innovation.

The researcher established that zero grazing at first instance appeared to be complex considering the close attention its husbandry demanded of adopters but it took efforts of extension agents and innovators to convince majority of farmers of the local relevance of the innovation, hence adoption. The livestock production officer and agents of NGOs reported that persuasive messages were crafted in a manner that took into account the target population's current situation and future needs, hence the successful adoption. Propagators of the innovation reported deploying a systematic persuasive campaign that involved careful assessment of the communication needs of Tot farmers (what does zero grazing involve, its risks and benefits), their objectives (to benefit maximally from their cattle keeping practice) and activities (livestock keeping as a way of life) to win them over.

The study found out that change agents had huge influence on farmers' innovation decisions in a direction they deemed desirable. During the key informant interview, they disclosed that they carefully developed a perceived need for change, established an information exchange relationship (credibility), diagnosed problems facing livestock farmers, created intent to change in the farmers, translated those intents into actions, and stabilized adoption to prevent discontinuance. All the change agents involved in promoting adoption of zero grazing

in Tot Division are from the local community hence their persuasive campaigns with farmers was aided by homophily—similarity in socioeconomic characteristics.

From the data, it is plausible to argue that not all the interpersonal channels had similar wider use or impact in the zero grazing diffusion and adoption process. Family members, friends, churches, and co-farmers/early adopters, women and youth group meetings were widely used and had huge influence in the adoption decisions of farmers. Opinion leaders, field demonstrations, farmers' field days in schools and non-state agencies' farms, visits to neighbouring counties, public barasas, and non-governmental organisations such as World Vision, CJPC and Child Fund follow closely in their usage and influence. This could be attributed to their reputation among residents as being trustworthy, knowledgeable and acting in the best interests of the farmers. However, government change agents such as livestock production officer and provincial administrators were less used and, therefore, their overall impact on farmers' adoption decisions were less profound. This could be explained by the established mistrust towards government officials and their formal approach to the promotion of the innovation.

Factors that Influenced choice of Interpersonal Communication Channels

Interpersonal communication channels such as opinion leaders, co-farmer, family member, peers, field demonstrations, and experts such as livestock production officers and development agencies' staff played an important role in the diffusion and adoption of the zero grazing innovation in Tot. The data from the field study reveal farmers were influenced by a number of factors in the choice of the interpersonal channels of communication they used to receive information about the technology as well as in making their adoption decisions.

The innovation's perceived attributes such as relative advantage, compatibility, complexity, trialability, and observability (Rogers, 2003) had significant impact on farmers' choice of interpersonal channels. To many farmers, zero grazing offered more advantages than the traditional free range system of cattle rearing, hence its adoption. To them, zero grazing innovation was both preventive and incremental (non-preventive). It was a preventive innovation in the sense that majority reported adopting it to lower the probability of losing their herd of cattle to cattle rustlers from the Pokot community, having witnessed early adopters' herds in zero grazing units spared from rustlers. The incremental nature of zero grazing meant that farmers were attracted to its quick wins such as superior productivity. In an environment where diseases had perennially wiped out cattle herds, many respondents argued that zero grazing offered a clear advantage of making disease and vector control easy. These were evident from co-farmers and NGO demonstration farms—thus, their channel choices.

Zero grazing was perceived as being compatible with the existing values, past experiences, and needs of farmers in Tot, hence there was no uncertainty as to its outcomes and hence the high rate of adoption. Even its name incorporating grazing was consistent with the practice of free range system of livestock keeping—grazing livestock has been an age-old phenomenon among farmers in Tot. Many respondents reported having no difficulties in mastering the new innovation, hence its adoption. They have for years kept dairy animals, albeit in a free range system. However, they said the restricted manner of the grazing and the new breeds were the divergent elements, but the cow shed was just an improvement of their traditional ones. The availability of early adopter farmers, demonstration farms, technical staff of NGOs, opinion leaders and livestock extension officer made adoption decisions much easier.

The opportunity to try out the innovation by starting with a single cow was said to have played a role in diffusing the innovation. Adoptees reported receiving technical assistance from change agents and others; hence they were able to reduce the degree of uncertainty about the consequences of adopting the innovation.

Majority of respondents had the opportunity to observe the results of the innovation from those who had embraced it and from demonstration farms. Role modeling or peer observation was cited as the key motivational factor in the adoption decisions of most farmers. Demonstration farms were useful in helping farmers observe and try it the innovation out. Others had study tours to Uasin Gishu and Nandi counties where zero grazing was widely practiced. Local NGOs and women and youth groups were reported to have been behind most of those study visits. Although there was need for standardized husbandry, each adopter modified in terms of the cowshed and such structures as feeding troughs and construction materials where some used local poles instead of commercial timber, grass and banana leaves instead of iron sheet roofs.

“Through our church, we visited some farmers in Nandi and were able to see zero grazing in practice. We even sourced our breeds from those farmers,” said a respondent. Also, the feature of zero grazing as a production-oriented innovation was cited as playing a part in making its adoption much easier.

An interesting finding from this study is that the innovators category comprised of farms run by aid agencies and schools which adopted the innovation. It can be argued that these institutions became the first point of contact between the farmers and the innovation. Opinion leaders such as teachers, provincial administrators, leading farmers who are enlightened easily fit into the early adopters' category. Their channel choices were thus limited to the livestock extension officer, development agencies and their demonstration farms. The early adopters were the basis on which other farmers made their adoption decisions and observed the innovation in practice.

Majority of respondents reported seeking the support of others they trusted in the course of their decision-making to adopt the innovation. *“I had bought into the idea after attending a barasa addressed by World Vision staff but still felt uncertain. A few days later I sought the opinion of a neighbour, you know the wearer of a shoe knows where it pinches. I proceeded knowing what I was getting into,”* said one respondent. Some respondents talked of ignoring messages that portrayed the innovation negatively and instead sought supportive messages that confirm their decisions. This way, majority sought second opinions from trusted friends, neighbours, opinion leader and family after being exposed to persuasive messages.

There was also an official decision to adopt zero grazing in response to the menace of cattle rustling that had ravaged the division for years. The provincial administration and the livestock department disclosed that they thought that with mass adoption, zero grazing would in the long run replace the free range livestock rearing practice that was prone to rustling. Thus, the cattle rustling phenomenon presented a single problem to be resolved by residents and zero grazing presented an opportunity to address the challenge, hence its ease of adoption.

Contributions of Interpersonal Channels in Zero Grazing Innovation-decision Process

Results of this study reveal that interpersonal communication channels were critical in the varied persuasion campaigns carried out by government agencies and non-governmental organizations, hence the successful adoption of zero grazing among residents of Tot. Because of the then existing threat from cattle rustlers and the increasing pressure facing the free range system of cattle keeping in the area of study owing to depleted pasture fields, fear

appeal in the persuasive messages by NGOs, livestock extension officer, opinion leaders and the churches played a role in diffusion and adoption of the zero grazing technology.

The researcher asked respondents to list their interpersonal connections in order to investigate the effect of interpersonal network links on the new innovation's diffusion and adoption. The results show that interpersonal channels of communication played a pivotal role in shaping farmers' attitudes towards the zero grazing technology and its ultimate adoption. This was fuelled by interpersonal channels such as opinion leaders, co-farmers, provincial administrators and churches that dispelled the inherent resistance to new dairy breeds and their 'complicated' husbandry. The research also found that farmers who are cosmopolite were likely to adopt zero grazing. One of the most important findings was that farmers who had more interpersonal networks adopted the innovation more quickly than those that did not. Many respondents cited interpersonal communication channels with peers as having had a strong influence on their adoption decision process. Many respondents revealed that their adoption decisions were greatly influenced by friends and co-farmers and that the channel choice had an impact on their adoption decision.

The collectivist culture of the respondents made it possible for such interpersonal channels as public barasas, women and youth groups to have a greater impact on the respondents' innovation-decision processes. Phrases such as *'we're one people,' 'we don't want to leave others behind,' 'we are not happy when one family has milk and another lacks'* were uttered by respondents to affirm the collectivist nature of their culture. Many youth and women embraced the innovation on account of the interpersonal channel they were exposed to by belonging to groups. Similarly, the older farmers were persuaded to try out the innovation through barasas. It is noteworthy that the elderly highly valued such forums and its deliberations, hence their adoption of zero grazing, albeit after many years.

Technology introduction always confronts uncertainty from the target recipients (Rogers, 2003) and this was the case with zero grazing among traditionalist Tot livestock farmers. Interpersonal channels such as peers, co-farmers, demonstration farms, opinion leaders, churches, and NGOs became handy in reducing the uncertainty surrounding the innovation by giving target farmers an opportunity to observe and try out, hence wide adoption of zero grazing. Significantly, the propagators of the innovation, especially NGOs, devised a comprehensive persuasive campaign that ensured that the interpersonal channels of communication deployed would be effective in achieving the desired result of wide adoption of zero grazing among farmers. Their continued presence in the study area beyond the initial wide adoption of zero grazing has been key in stabilizing adoption and preventing discontinuance.

From the results of the study, it is evident that interpersonal communication channels were an integral part in the success of zero grazing innovation decision process. Rogers (1995) postulated that the innovation-decision process is five-stage, namely; knowledge, persuasion, decision, implementation and confirmation stages (Table 2). The innovation-decision process starts with the knowledge stage during which innovation targets gain information about existence of an innovation and also gain knowledge on how to use an innovation correctly and the functioning principles describing how and why an innovation works (Rogers, 1995). In the case of Tot, interpersonal channels such as friends, neighbours, co-farmers, change agents such as livestock production officers and developmental non-governmental organisations were instrumental at this stage in communicating the existence of the innovation and how it works. At the persuasion stage, according to Rogers, the individual adoptee relies on trusted friends and colleagues' subjective evaluations of the innovation that

reduce uncertainty about the innovation outcomes. These sources are usually more credible to the individual. Co-farmers, family members and opinion leaders played this role in zero grazing adoption in Tot.

Rogers notes that at the decision stage, if an innovation has a partial trial basis, like zero grazing, it is usually adopted more quickly, since most individuals first want to try the innovation in their own situation and then come to an adoption decision. The study's findings reveal that interpersonal communication channels like field demonstrations, co-farmers and experts (livestock officers and aid agencies' staff) were critical at this stage in affording farmers to see first-hand how the innovation works in practice and try it out on their farms. At the implementation stage, uncertainty about the outcomes of the innovation still can be a problem, Rogers adds. In the diffusion and adoption of zero grazing in Tot, this uncertainty was resolved when individual farmers sought and received technical assistance from change agents and early adopters, thus reducing the degree of uncertainty about the consequences of adoption.

The confirmation is the final stage at which stage the individual looks for support for his or her decision. For Tot farmers, interpersonal channels of communication such as family, friends, co-farmers who had adopted the innovation, field demonstrations and visits/advice from experts were important in affirming the adoption decisions and ensuring continued adoption of zero grazing innovation. However, Ryan and Gross (1950), in their study of diffusion of hybrid seed corn in Iowa, found out that farmers tended to name salesmen (who were often other farmers) as their first source of information about hybrid seed corn, and friends or neighbors as the channel used when they made their decision to adopt. Ryan and Gross concluded that interpersonal channels were very important in the diffusion process.

Innovation-decision stage	Interpersonal channels of communication used
Knowledge	Friends, neighbours, co-farmers, change agents such as livestock production officers and developmental non-governmental organisations
Persuasion	Co-farmers, family members and opinion leaders
Decision	Field demonstrations, co-farmers and experts (livestock officers and aid agencies' staff)
Implementation	Change agents and early adopters
Confirmation	Family, friends, co-farmers who had adopted the innovation, field demonstrations and visits/advice from experts

Table 2: Interpersonal channels used in each innovation-decision stage

Conclusion

This study presents pragmatic evidence about zero grazing adoption decisions of dairy farmers in Tot through a non-probability purposive sampling approach. The results indicate that farmer decisions to adopt the innovation were influenced by the interpersonal communication channels used in propagating the new idea, factors that influenced choice of the interpersonal channels and the contributions of those channels to the overall diffusion and adoption of zero grazing.

The diffusion of innovations is a rich, complex, challenging, and rewarding area for communication and information research and practice. The diffusion of innovations theory is of particular importance to those interested in attitude and behaviour change in a natural setting, such as in Tot Division. Innovations may be complex, they may produce small absolute rewards, they may depend on the slow evolution of complementary institutions, and they

may depend on the activation of natural social networks. Although many members of the audience may be reached directly with information, the success of a communication campaign may still depend on natural social diffusion processes in a community.

Dairy farmers in Tot have strong social networks of friends, co-farmers, family, self-help groups and opinion leaders that played a critical role in diffusing the zero grazing innovation and influencing their adoption decisions. Adoptees had access to and made use of these multiple interpersonal channels of communication to receive information on the innovation and base their adoption decisions on. Although the study found that there is significant gender difference in the adoption of zero grazing, this researcher argues that attitudes towards new technology, in addition to gender, is responsible for the low level of zero grazing adoption among women.

The centrality of change agents in the diffusion and adoption of the innovation among dairy farmers in Tot has been demonstrated as players like World Vision, Child Fund, CJPC, the church and livestock production officer were actively involved in persuading farmers to adopt zero grazing. Farmers' decisions to adopt were largely personal, group and to a limited extent official.

For successful diffusion and adoption of innovations such as zero grazing, this study observes that diffusion of innovation studies on the effects of exposure to interpersonal medium of communication should take into account the probability that communication effects extend beyond the contacted farmer, thus the need to make communication content reflect local contexts. This, therefore, calls for increased attention to the contexts within which specific persuasive messages are deployed in a campaign such as the promotion of zero grazing technology.

Implications of the Study

Drawing from the conclusions, this paper observes that to increase the rate of adopting innovations like zero grazing and to make relative advantage more effective, direct or indirect financial payment incentives, as part of support and motivation factors, should be incorporated as part of persuasive campaign strategies to support the individuals of a social system in adopting an innovation.

In the context of huge financial and risk implications for adopting zero grazing in semi-arid areas like Tot Division, this study recommends that farmers be facilitated to access financial and extension services, and livestock insurance products that will act as incentives to embrace persuasive messages. Existing technology options for farmers should be made more available and accessible through the highly effective interpersonal channels of communication. These efforts must also acknowledge the need for complementary investments in the capacity to effectively and sustainably use new technologies by, for example, the government funding the establishment and sustaining of demonstration farms.

Policies to support the diffusion of information related to innovations such as zero grazing and to help interpret those messages within specific localities in terms of their agronomic and economic implications are required to help both extension agents and farmers respond well to new information. Women in particular often lack access to extension information services and to appropriate technologies. Failing to integrate gender and age into agricultural sector policy reform have major implications on economic growth; poverty reduction and equity; and governance—the key pillars of economic recovery and employment creation that the Kenyan government focuses on.

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