

Enhancement of Agricultural Extension Services in Kenya: A Case of Embu County

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Abstract

The respondents included 210 farmers from three divisions of Embu County namely, Manyatta, Nembure and Central. Area (cluster) and systematic sampling procedures were used to interview them. 5 farmer Focus Group Discussions (FGDs) were carried out in the same localities. Purposive sampling was used to identify the key informants who included 50 agricultural extension personnel, 14 researchers, 13 information professionals, 32 planners and policy makers. The study was informed by Diffusion of Innovations (DOI) theory by Rogers. Mixed methods approach with a bias towards qualitative method was used for data collection. SPSS data analysis software was used for data analysis. Farmers would prefer a more personalized extension service as opposed to the practiced Common Interest Groups Service. 77.1% of the farmers rely on extension services. 61% of the farmers attend field days and are highly receptive to innovations via demonstrations. 82% of the extension personnel own mobile phones, 10% send text messages to the farmers while 12% communicate with the farmers during emergencies only, while 97.7% own radios and 82.9% own TV sets but are non-committal as to the programmes followed. Computers are scarce and mainly used by senior extension personnel for their official duties. Low academic levels amongst extension personnel impede computer use. Extension personnel's educational level to be raised to a minimum of a Diploma and their information literacy skills improved. Agricultural telecentres run by agricultural information scientists for each village and a national information and knowledge repository recommended.

Keywords: Kenya Agriculture, extension service, agricultural information, Telecentres

1.0 Introduction

Agricultural extension, simply explained means the delivery of agricultural information, knowledge, innovations and prompt advisory service to farmers for practical application. The International Food Policy Research Institute (IFPRI)-(2018) posits that agricultural extension (also known as agricultural advisory services) plays a crucial role in promoting agricultural productivity, increasing food security, improving rural livelihoods, and promoting agriculture as an engine of pro-poor economic growth. In general, therefore, agricultural extension services entail the transfer and exchange of relevant and timely agricultural information, knowledge and innovations or skills to the farming communities for optimal agricultural yields.

1.1 Background Information

This paper is part of a study on “the accessibility and use of agricultural information by farmers in Kenya: a case study of Embu County.” The role of agricultural extension in the fight against poverty and food insecurity is underscored in the Kenya agricultural sector. Kenya government has over the years employed various extension styles which included the progressive farmer model (where other farmers would learn and benchmark against the progressive farmer), Training and Visit (T&V), and Farmer Field Schools (FFS) among others. Other than the FFS which is still being practiced for field demonstration purposes, the other two are no longer commonplace.

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The farmer Common Interest Groups (CIGs) model where advisory services are given to the groups on demand is currently in use. Low extension: farmer ratio makes it difficult for agricultural extension personnel to give personalized advisory service to individual farmers. In this regard, the National Agriculture and Livestock Extension Programme (NALEP) is the main government extension programme which is implemented by the Ministry of Agriculture Livestock and Fisheries with support from the government (NALEP-Gok) and Swedish International Development Agency (NALEP-Sida). As reported by Muyanga, and Jayne (2006), NALEP aims at enhancing the contribution of agriculture and livestock to development and poverty alleviation by promoting pluralistic, efficient, effective and demand-driven extension services among farmers and agro-pastoralists. NALEP has an information service known as National Farmers Information Service (NAFIS)-(www.nafis.go.ke) which enables farmers to get extension information simply by calling the service or browsing the NAFIS website.

As indicated in its website (<http://airc.go.ke/>) the Agricultural Information Resource Centre (AIRC), a Division in the Ministry of Agriculture Livestock & Fisheries, is dedicated to serve a wide range of audience in the agricultural sector with specialized agricultural information through innovation and modern technologies. It provides quality agricultural information and skill training to farmers and stakeholders in order to enhance farmers' ability to increase agricultural output. Kenya mainly depends on agriculture for its economic development. Continuous improvement of the agricultural sector in order to be able to feed its people as well as have a surplus for sale is crucial. The sector directly contributes 26% of the Gross Domestic Product (GDP) and in addition, 27% of the GDP via linkages with manufacturing, distribution and other service related sectors. Njehu (2018) notes that the smallholder farmers form 70% of rural labour force and calls on the Kenya government to invest in strategic programmes that support sustainable agricultural practices for food security. Njehu (2018) further posits that "by offering training and technical support through the county extension service officers, these teams of well-organized farmer groups have the potential to feed this nation and have surpluses for the export market".

1.1.1 Land Availability and Use in Embu County

Out of the total area of Embu County, 2,168 km² is arable land, 653.9 km² non-arable land and 596.1 km² comprises water mass. The largest proportion of arable land is used for agriculture with small scale farms averaging 0.8 of a hectare (2 acres) forming the majority following land fragmentation over the years. The large scale farms average 3 hectares (7.5acres).

1.2 Statement of the Problem

It is paradoxical that a County with the above noted expanse of arable land should be food insecure. In its attempt to meet the first and crucial Millennium Development Goal (MDG) on eradication of extreme poverty and hunger, Embu County has intensively invested in poverty reduction measures especially in reduction of food poverty. Among other strategies to improve the agricultural sector, the Embu County Integrated Development Plan 2013-2018 advances the need to use irrigation and diversification of crops so as to increase food production and provide employment to majority of the population. For the above noble plan to be realised, the efficiency and effectiveness of the extension services delivery is paramount and hence the need for this aspect of the study. Embu County hosts one of the Kenya Agriculture and Livestock Research Organisation (KARLO)'s rural centres where local research is carried out for continuous improvement of farm yields. In addition, it has a Farmers' Training Centre (FTC) and a couple of institutional and public library and information services. With all the above noted information and knowledge sources notwithstanding, Embu County is always experiencing some degree of food insecurity. It is for this reason that this paper examined the current status of agricultural information and knowledge dissemination to the farmers in the County.

2.0 Theoretical Framework

This study was mainly informed by Rogers' Diffusion of Innovations (DOI) theory (Rogers, 2004) and various information communication or dissemination models such as the Rural Knowledge Centre model or Telecentres model (Roman, 2004) and Wilson's information seeking behaviour model Wilson (1981) to a lesser extent. The fulfilment of Maslow's hierarchy of human needs as listed by McLeod (2017), which include physiological needs, safety needs, belongingness and love needs, esteem needs and self-actualisation needs) is also considered requisite in preparing a fertile ground for easy transfer and adoption of pertinent agricultural information, knowledge and innovations by farmers.

A number of factors interact to influence the diffusion of an innovation. Factors which facilitate and conversely those that impede the adoption are equally considered and mitigation measures suggested where possible. This is done in pursuit of growth and development of the agricultural sector in the county. In his review of literature for his dissertation, Rogers (2004) argues that diffusion is a general process, not bound by the type of innovation studied, by who the adopters were, or by place or culture. He affirms that diffusion of innovations is a kind of universal micro-process of social change and hence the reason for basing this study on this theory. Generally, innovations are begun by a small group of innovators and at times by an individual. The number of adopters increases until when the last group of laggards come on board. In a detailed review of Rogers diffusion theory, Sahin (2006) notes that peoples’ attitude towards a new technology is a key element in its diffusion and that innovation diffusion is a process that occurs over time through five stages which include knowledge, persuasion, decision, implementation and confirmation. Figure 1 below exemplifies the process:

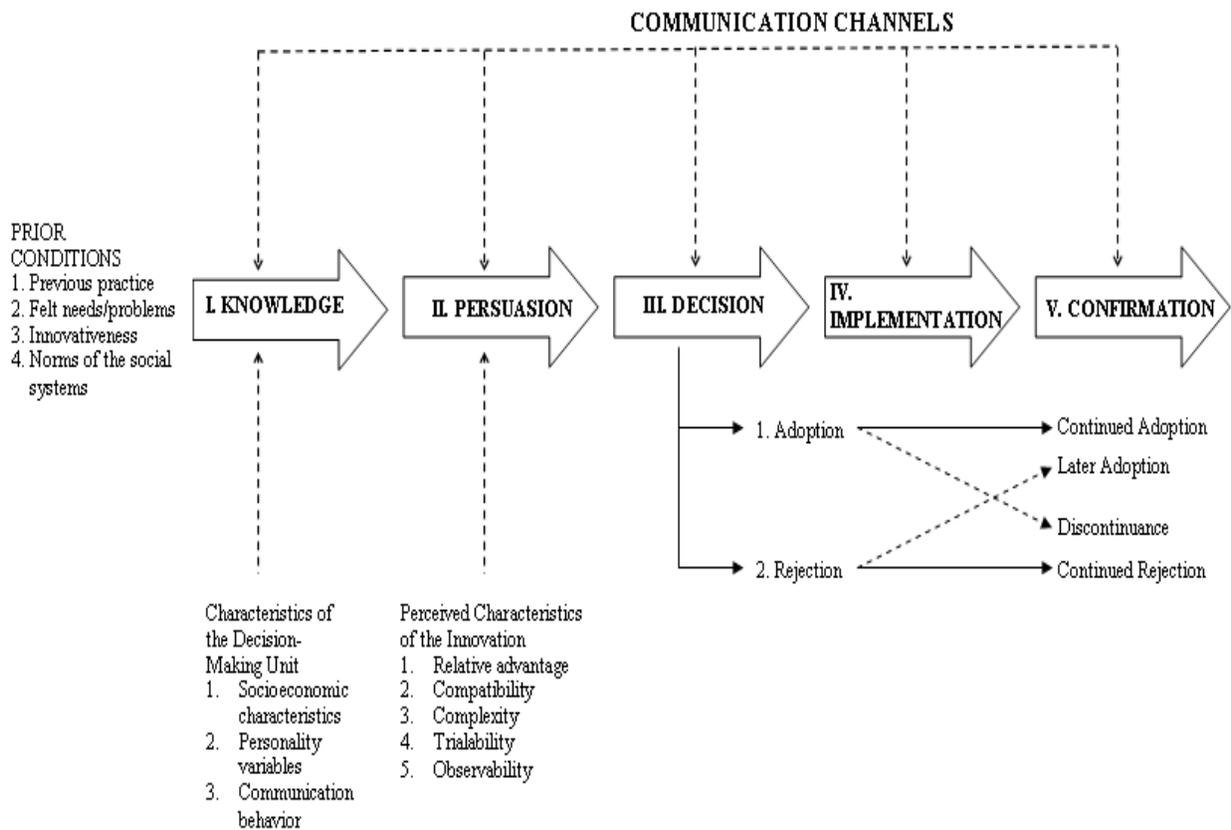


Figure 1: A Model of Five Stages in the Innovation-Decision Process. (Source: Diffusion of Innovations, Fifth Edition by Everett M. Rogers (2003) as cited in Sahin (2006).

3.0 Literature Review

Literature review gives the backdrop against which agricultural extension services are given out.

3.1 The State of Agricultural Extension in Kenya

Gakuru, Winters, and Stepman, (2009) have highlighted several issues on innovative farmer advisory services using “traditional” forms of ICTs in Africa, which include the radio and TV programmes featuring agricultural information. They have further elucidated the fact that rural telecentres provide information on education, agricultural and health issues and equip rural citizens with skills on how to use computers and provide basic literacy. National ministries of agriculture have attempted to integrate ICTs into the delivery of information and have established district information centres focusing on agriculture. The extension workers have not been increasing while farming numbers have been increasing calls for creation of innovative services such as web-based services to address this gap.

However, Gakuru, Winters, and Stepman, (2009) note that the high degree of farmer illiteracy is a limitation in seeking information from such a platforms, the sparse internet infrastructure notwithstanding. In addition, the widespread use of mobile phones, voice and SMS solutions offer easy information accessibility despite the challenges of transferring limited amount of information and at the same time requiring some basic level of literacy.

Decentralization of agricultural extension services in Kenya from the central to local governments has helped farmers to express their demands for agricultural innovation (Kigatiira, Mberia and Wangula, 2018). This is true indeed but the fact that extension services in Kenya are demand driven thorough the Common Interest Groups in each community leaves a lot to be desired. Unless the farmers are information literate, that is being able to identify and locate information and or knowledge, evaluate it and use it for further innovative knowledge creation, it would be an uphill task for them to fully identify their real needs. In addition, low extension agents': farmers' ratio poses the question that lingers unanswered today on how the farmers can get personalised extension services as opposed to group attention.

The inadequacy in crop and dairy yields in Embu County could be attributed to lack of quality and personalised information service to the farmers. The need for personalised information service to the farmers was further elucidated in the study by Kigatiira, Mberia and Wangula, (2018) in Meru County, which borders Embu County. They found out that whereas extension officers claimed to disseminate information on marketing, farmers asserted that they were not given such information. They felt that the 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. It is for this reason that this study engaged various respondents to find out the status quo of the agricultural extension service in Embu County and in addition, their respective views on the issue.

3.2 Meeting Farmers' Information Needs as a Precursor to Socio-economic Development

The first of the Millennium Development Goals (MDGs) targets reduction of extreme poverty and hunger (UN, 2008). The goals were widely accepted as a framework for measuring development progress. They focus the efforts of the world community on achieving significant, measurable improvements on people's lives (The World Bank, 2003). The symbiotic kind of relationship in the fulfilment of the MDGs is further exemplified by Maslow's theory of human needs which advocates for a holistic approach to meeting all human basic needs for sustainable development (McLeod (2017). In addition, among the UN 17 Sustainable Development Goals (SDGs), the first two are "no poverty" and "zero hunger" respectively. For Kenya to be able to achieve the two goals among others, the agricultural sector would require some radical transformation in accordance with the government's Vision 2030 (Kenya's national long-term development blue-print aiming to transform Kenya into an industrialising, middle-income country providing high quality of life to all its citizens by the year 2030).

3.3 Agricultural Information for Poverty Reduction Strategy

In their study on the agricultural information literacy of farmers in the northern region of Bangladesh, Akanda and Roknuzzaman (2012), observe that information is a vital resource for all socio-economic activities, and affirm that there is no such field of human endeavour wherein information is not a component. Information is a vital empowering tool in any form of planning and decision-making. According to Okoth (2016), Kenya must fully tap its vast agricultural potential to achieve inclusive economic growth, reduce poverty and create jobs. Okoth (2016) further notes in dismay that Kenya's Vision 2030 puts agriculture among the priority areas in an effort to bolster the country as a middle income economy. However, he points to the fact that efforts to transform the sector have not borne significant fruit, with plans to reduce reliance on rainfall having made just baby steps. Okoth (2016) further quotes local agriculture players as having reiterated that "Kenya still has a long and winding road to travel before it can tap the vast potential of the sector".

In Kenya, majority of the people are still living below the poverty line, in which they experience absolute poverty which is based on the cost of the minimum basic food and other necessities needed to sustain human life. This minimum is globally, one US dollar a day (UNDP, 2000). As indicated in the Kenya National Development Plan (2002-2008), it is difficult to achieve sustainable economic growth amidst poverty. Kimenyi (2002), almost two decades ago, posits that information professionals have a bigger challenge than the other stakeholders, in that, any form of sustainable development depends first and foremost on information. It is the main resource needed to empower both men and women to freely create, receive, share and utilise information and their knowledge for their economic, social, cultural and political development.

Kilele (2006) recounts that immediately after independence; Kenya Government identified three vices that militated against development. These he notes were poverty, ignorance and diseases but quickly adds that the same vices still remain the main enemies of development. This situation still persists today over a decade later, despite the fact that Kenya government's Economic Recovery Strategy for Wealth and Employment Creation (ERSWEC) had been put in place in 2002.

3.4 Agricultural Information for Sustainable Development

There is a clear affirmation by Muyanga and Jayne (2006) that an extension system that does not significantly contribute to improving the lives of its clientele is inappropriate. The eminent role of agricultural information and or knowledge as vital ingredients in the economic development process of the Kenyan farmer is therefore not debatable. Piasecki and Wolnicki (2004), argue that contemporary development studies more often include interaction between economic, social and environmental problems to identify what could be handled locally, internationally or globally. In this regard therefore, the farming communities' information needs ought to be identified, appropriate information sought, evaluated and packaged for their access and use in making decisions on farming. This school of thought is informed by Petuchovaite and Lipeikaite (2014) who elaborately report on the public and community library pilot projects focused on meeting farmers' needs for information and access to resources provided by governments in different developing countries. They have affirmed the need to supply farmers and particularly small scale farmers with pertinent information at whatever cost to improve productivity and subsequent economies of the respective countries. "Connect Uganda" Project is a good example where five community libraries have come together to develop an agricultural information service in local languages spoken by farmers. The project team is reported to have worked with the Uganda Community Libraries (UgCLA), Makerere University Centres for Lifelong Learning, government farm support agencies and farmers' groups, to launch a community library programme that includes ICT skills training for farmers and creation and packaging of information in local languages.

In Kenya, Agricultural Information Resource Centre (AIRC) of the Ministry of Agriculture Livestock and Fisheries attempts to repackage information for farmers in indigenous languages but it is overwhelmed considering that there are 42 different spoken languages in Kenya. However, with active adult education programmes, rural communities are getting more literate and this will make it possible to repackage information in the national language (Kiswahili) for use by all farmers in the nation.

3.5 The Role of Women in Rural Farming Activities

Kimenyi (2002) notes with concern that the farmer is not an active player in the design and formulation of agricultural policy and further expounds that, of critical importance is the participation of women in the decision making process at household and national levels. Women do the bulk of the farm work in Kenya and in other parts of Africa, yet they remain marginalised despite their central role in agricultural production. This, he notes is compounded by the fact that women are marginalised in their access to education and health opportunities and have inadequate access to productive resources such as land and finance. However, this situation has since then improved, because Kenya's constitution (2010) allows women to inherit land from their fathers and late husbands. In addition, the issuance of the Kenya national identity cards to women (in 1978 for the first time), increasingly enable women to access credit facilities, buy and develop land independently. This positive move is transforming and will continue to transform the position of women in the adoption of agricultural innovations.

3.5.1 Women and Sustainable Rural Development

The broad objectives of rural development are social-economic growth or poverty alleviation and improved management of the natural resources such as agriculture and forestry. Technology development and its rapid adoption in agricultural production and processing systems are key elements in achieving these. Wafula-Kwake and Ocholla (2007) emphasise that, in order to create a demand-driven ICT consumer community in rural areas, hindrances to accessibility must be significantly reduced either before or during the provision of the technology. They further suggest that there is a need to integrate ICT with literacy education in many is as due to high levels of illiteracy in computer technology and in basic education amongst rural African women.

Magambo (2010) posits that Kenya's agricultural sector is characterised by gender inequalities that hurt the performance of the sector. Kenyan women contribute up to 60-80% of labour in household and productive activities and specifically agricultural production (Republic of Kenya, 2010). This report further indicates that generally, women work longer hours than men.

Consequently, this excessive labour contributes to women's poorer health and nutritional status and high maternal mortality. Many Kenyan women work in farm activities to produce food, craft production and engage in informal trade with regard to these productive activities (Muteshi, 2006).

3.6 ICTs for Agriculture in Kenya

ICTs have a transformational role to play in tapping the agricultural potential of Kenya as a nation. Kenya government takes the role of ICTs in development very seriously and as such has continued to improve the rural power supply in order to facilitate connectivity and ultimately access to agricultural information. This is exemplified by the Agricultural Technology Information Response Initiative (ATIRI) model developed by the Kenya Agricultural and Livestock Research Organisation (KALRO) in 2000. Maina, Leonhaeuser and Bauer (2010) reported that farmers' groups are among the clients who benefit from ATIRI as they seek technological information via the extension services provided by the Ministry of Agriculture, Livestock and Fisheries. In this regard, the Kenya National Information Communications Technology (ICT) policy is timely in as far as information access and dissemination in Kenya is concerned (Republic of Kenya, 2006). The rural electrification programme in most parts of the country is an important preparation for use of ICTs in the rural areas. Both Gurstein, (2000) and Roman (2003) advocate that farmers should be able to use telecentres (shared access facilities equipped with telephones, computers, television and video, and other technological devices). This is supported by Esipisu (2013) – state house spokesperson in Kenya, – when he recommended that Kenyan populace must embrace simple technology for the nation to be food secure. Ewan (2017) affirms that “technology does not exist to replace extension workers, or the old way of doing things, instead it provides a valuable complimentary service that enables the modern farmers to access the information they need, whenever they need it”.

4.0 Methodology

This paper is mainly concerned with the services of the extension personnel in Embu County.

4.1 Research design

The sample constituted 210 farmers, 52% (110) male and 48% (100) female household heads drawn from three divisions of Embu County namely, Manyatta, Nembure and Central. The key informants in this study included a total of 50 extension personnel who were serving at the County, 14 agricultural researchers based in KARLO, Embu regional centre, 13 information professionals (mainly librarians from the County), 32 planners and policy makers (mainly drawn from the Ministry of Agriculture, Livestock and Fisheries, governmental and non-governmental organisations). 5 Farmers' Focus Group Discussions (FGDs) also informed this study.

4.2 Sampling Technique

Area (cluster) and systematic sampling was used to select a sample from the farmers' population and focus groups. However, purposive sampling method was used to select the above noted key informants. Among them, 50 extension personnel were sampled from the official records in the Sub-County Agricultural Office, Deputy Sub-County Agricultural Office, Sub-County Livestock Production Office and Deputy Sub-County Livestock Production Office respectively.

4.3 Data Presentation, Analysis and Interpretation

Data presentation, analysis and interpretation mainly cover the data collected from 50 extension personnel in Embu County. However, other collected data in this study is only referred to where found necessary.

4.3.1 Extension Personnel

According to the government report, Republic of Kenya (2010), agricultural sector extension service plays a key role in disseminating knowledge, technologies and agricultural information, and in linking farmers with other actors in the economy. The report further notes that extension service is one of the critical change agents required in transforming subsistence farming to a modern and commercial agriculture to promote household food security, improve income and reduce poverty. The other players who influence extension services in Kenya include the coffee and tea cooperatives that provide a wide variety of services, including inputs supply, processing and marketing of the cash crops. Faith-based farming initiatives such as the project run by the Catholic Church at Kangaru and the one run by the Anglican Church of Kenya (ACK) at Macumo in Embu are typical examples of semi-private enterprises that help in advancing agricultural innovations in the County.

Due to time constraints, the researcher was not able to keenly study the extension services provided by the private sector but covers the public sector extension service which forms the bedrock of the extension service in Kenya. A total of 50 extension personnel of differing cadres were interviewed. The response and enthusiasm was excellent although there was some non-response in some parts particularly in the many cases where the officers had to independently write down their respective answers. The extension personnel's competence in educating and advising the farmers on farming skills is paramount for the growth of Kenya's economy. To ascertain this competence, the researcher joined the farmers on a field day which was held in Kathageri, Kigumo Market, Embu.

4.3.1.1 Characteristics of Extension Personnel

• Gender Categorisation

56.1% of the extension personnel were male while 43.9% were female. The 12.2% difference is an indication that women are increasingly getting involved in agricultural extension service unlike in the yesteryears.

• Age Range

As indicated in table 1 below, majority of extension personnel are in the middle age (40-59 years of age), giving an indication that they are experienced in their various responsibilities and that they may, to a certain extent, understand the farmers' information needs better. The youth (20-39 years of age) are minority and constitute 14 % of the extension personnel.

Table 1: Extension Personnel: Age Range. N=50

Item	Frequency	Percentage
20-29	1	2.0
30-39	6	12.0
40-49	18	36.0
50-59	15	30.0
Non-response	10	20
Totals	50	100.0

• Educational Levels

40.0% are certificate holders, while 26.0% Diploma holders, 12.0% university degree holders and 2.0% High School (A-Level) Certificate holders. Only one extension personnel has a postgraduate degree. From the comparative table 2 below, it is obvious that women are excelling in higher education with those at degree level being more than men by 4.9%.

Table 2: Extension Personnel: Comparisons of Highest Level of Education

		Highest level of education						Total
		Secondary	High school	Certificate	Diploma title	University degree	Post-graduate degree	
Gender	Male	2.4%	2.4%	19.5%	24.4%	4.9%	2.4%	56.1%
	Female	2.4%	0%	24.4%	7.3%	9.8%	0%	43.9%
Totals		4.9%	2.4%	43.9%	31.7%	14.6%	2.4%	100.0%

4.4 Extension Personnel's Views on Farmers' Information Seeking Habits

26.0% of the extension personnel indicated that farmers mostly sought information on farm inputs and improved farming methods (respectively), 18.0% on marketing strategies, 12.0% on farm management methods, and 2.0% on credit information, diseases and pest control respectively. 38.0% of extension personnel indicated that farmers are driven by the need to increase production, 28.0% for information on better methods of farming 12.0% for information to gain further farming knowledge and 4.0% for information on how to use complex inputs.

When asked to explain how they (extension personnel) get agricultural information when need be, they gave the following answers; 38% accessed information from the Ward agricultural office, 22% from research institutions, 10% from print materials, 8% from the internet and 6% consult colleagues for information.

This question was posed to find out the degree of awareness of the agricultural information sources by this group as well as its level of information literacy. On the progressive farmers as a source of information, 28% of the extension personnel reported that progressive farmers do encourage other farmers to improve on their methods of farming, 18% said that farmers learn from each other or rather, the learning is reciprocal, 14% said that the progressive farmers are not very useful in terms of information transfer while 4% noted that progressive farmers do not necessarily have adequate information and others are uncooperative and, 2% said that progressive farmers lack time to interact with other farmers.

24% of the extension personnel said that the radio programmes motivate the farmers, 12% noted that the programmes are useful and that they sensitise the farmers about agricultural innovations, 8% said that the radio provides market information on agricultural products; 6% reported that very few farmers listen to the radio while, 2% said that the radio provides understandable information to the farmers. In this regard, the development of local FM radio programme in vernacular (Embu language) in the recent past is paramount. Interestingly, the extension personnel were not as conversant with the actual farming radio programmes like the farmers.

The extension personnel's opinion was sought on the usefulness of the agricultural TV programmes to the farmers. But just like the radio programmes, extension personnel did not seem too keen to answer this question and to list the programmes. In this regard, out of the 50 respondents, only 23 answered this question with 39.1% saying that majority of the farmers have no access to TV, 21.7% reporting that they (extension personnel) do not know any TV programme on farming, 21.7% listed "KilimoSalama" programme (a popular agricultural information programme aired by Kenya Broadcasting Corporation (KBC) and 17.4% vaguely indicated that they watch farming documentary films as and when screened.

The extension personnel's response to the usefulness of the internet facilities to the farmers was very poor. Out of the 50 respondents, only 25 answered the question and out of those who answered, that is, 52% said that many of the farmers were computer illiterate; 48% said that computers were not even available for farmers to use. The extension personnel's response to the usefulness of the public/community libraries as a source of agricultural information for farmers was very insignificant. Out of the 50 respondents, only 25 responded and they had the following to say; 64% said that the libraries are not available to the farmers, 16% reckoned that the libraries integrates the community, 16% noted that the farmers are reluctant to use the libraries and 4% said that the community is literate enough to use libraries.

The response to the usefulness of Embu Farmers Training Centre (FTC) was quite poor. 24% said that the FTC provides forums for integration, 10% stated that they facilitate learning from the experts, 10% noted that it is costly to travel to the FTC while 6% of the respondents stated that the FTC is rarely used. There was 50% non-response. The extension personnel had varied responses on the usefulness of the Kenya Agricultural and Livestock Research Organisation (KALRO) Embu regional centre which ostensibly serves the farmers as well as liaising with the set agricultural extension system. Table3 below gives a summary of the findings and indicates 25% non-response.

Table 3: Extension Personnel: Views on KALRO for Farmers Information. N=50

Item	Frequency	Percentage
Used only during field days	3	6.0
Highly productive in information	6	12.0
Provides information for students and farmers	11	22.0
High travel costs	4	8.0
Source of information for extension workers	1	2.0
Non-response	25	50.0
Totals	50	100

The public channels which the extension personnel use to communicate agricultural information to farmers were indicated as follows; 42% use barazas (community meetings usually organised by local chiefs or sub-chiefs), 14% farm visits, 4% local organisations, 4% information desks (usually mounted during the local market days) while 2% use the church forums and 34% did not respond.

4.5 Use of ICTs for Agricultural Information Communication by Extension Personnel

• Ownership and use of Mobile Phones, Radio and Television(TV)

82% own mobile phones. Only 10% send text messages to the farmers while 12% communicate with the farmers on mobile phone only when there is an emergency. 97.7% own radios and listen to programmes on farming practices. 82.9% own TVs and 37.5% watch agricultural programmes.

• Access to Internet and Agricultural Films/Videos

Only 44.4% have access to the internet but there was 42 (out of the 50) non-response on its usefulness indicating inexperience. Only 29.4% of the respondents indicated that they have access to films/ videos- though AIRC provides them for extension purposes as and when needed.

Awareness of ICT-Based Community Information Centres (telecentres)

Only 16.7% said that they know about them though there is none in the County. The extension personnel were asked to give their own opinion on whether the farmers' would readily accept and use agricultural information-based telecentres if they were to be established within the community. From the findings, 22% said that the farmers need to be sensitised on the importance of telecentres, 14% noted that most farmers are illiterate, 4% think that the farmers would be receptive in that most of them are literate while 2% think that the farmers would access them if equipped with relevant information. There was a non-response of 29(58%).

4.6 Farmers' Intra-household Gender Roles and Constraints on Farming Interests

58.6% of the extension personnel have ever witnessed gender constraints within the farming community, thus,16% indicated division of labour as a constraint, 12% control over resources, 10% access to training, 10% money from the sale of agricultural products, 8% use of land and 2% farm decisions. There was 21(42%) non-response.

4.7 Extension Personnel's Self Evaluation on Service to Farmers

32% said that the extension system provides useful advice to the farmers, 14% said that it provides opportunity to interact with farmers, 8% noted that it is useful in that it facilitates practical-oriented information, 6% noted that they provide needed information conveniently. However, there was still non-response of 18 (36%).

4.7.1Challenges Faced by Extension Personnel When Delivering Information to Farmers

16% cited insufficient information, 12% limited access to information, 12% long distance to sources of information, 12% farmers' unwillingness to seek for information, 4%, lack of documentation 4%, high farmer illiteracy levels and 2%, bad weather. There was a non-response of 19(38%).

4.7.2Extension Personnel: Opinion on Current Information Infrastructure

36% suggested that the coverage of information centres be improved, 12%, that the information function should be devolved (information centres be brought close to farmers' neighbourhood), 8%, that there should be more frequent farm information dissemination activities while 2% advocated for more research to improve on farm inputs. There was a non-response of 21(42%).

4.7.3Extension Personnel: Comments on Farmer's Degree of Information Literacy

26% advocated for enhancement of the farmers' trainings, 8%, increased information Dissemination activities, 8%, use of written documentation while 6% advocated for the use of vernacular in information dissemination. There was non-response of 26(52%).

4.7.4Extension Personnel: Views on Government's Policies on Agricultural Extension

12% suggested that each Ward should have an agricultural extension office,8% feel that the extension system is so far fairly good, 6% feel that the extension system has well-aligned policies, 4% are of the opinion that the government is moving towards enhanced technology while 2% indicated that there is need for the government to provide advanced information from research and that it should boost staff facilities and equipment. There were 33(66%) non- response. The findings review that the extension personnel in the public sector are oblivious of the government policy framework on which they are operating.

This may be due to their low literacy levels and majority being at the bottom of the employment scale. However, the educational levels are improving as the new crop of diploma and graduate employees get recruited. These new graduates, the researcher believes will be more inquisitive about the set quality operational standards and will hopefully work with more zeal.

5.0 Extension Personnel: Suggestions

Out of the 50 respondents, only 20 (40%) responded. 14% said that the extension system should utilise exchange visiting programmes where farmers visit other farmers' groups to mutually exchange farming ideas and expertise. 10% suggested that the extension system should improve staffing in terms of educational levels and numbers, as well as make improvement on equipment and other pertinent facilities. 8% suggested that agricultural information need to be constantly updated. 4% noted that there is need to involve the community in decision making. 2% indicated the need to motivate farmers to source for information. 2% said that there is need to improve rural electrification so that farmers can benefit from ICTs.

6.0 Results Discussions and Summary of Research Findings

I # Characteristics of Extension Personnel

(a) Age Range

In as much as the youth (20-39 years old) are presumably more innovative and conversant with the so much needed ICTs, they have to learn from the older generation of the extension personnel, so as to tap their age old tacit knowledge. Similarly the mystery of handling ICTs should be demystified for the older folk (40-59 years old) through aggressive training and psychological reassurance. In this regard, reciprocity in learning should be encouraged between the two groups (the old and the young extension officers) so as to form a symbiotic co-existence.

(b) Gender Categorization

The clear indication that women are increasingly getting involved in extension services as well as excelling in agricultural sciences is a move in the right direction. Research has shown that small scale farming in Africa mainly rests in the hands of women and therefore increased female extension personnel are likely to work well with their counterparts.

(c) Low Educational Levels

The fact that 12% are university degree holders, 26.0 % diploma holders while majority (40%) are certificate holders reviews that there is urgent need to improve the educational standards of this cadre of agriculturalists. The certificate level holders may have to be slowly phased out through retirement, so as to engage people with higher qualifications, who can fully understand agricultural technical innovations for further translation into practical application. The extension personnel need to be information literate and adequately equipped so as to independently identify, locate and evaluate information and or knowledge for use in the knowledge and innovation creation process.

2# Information Dissemination and Seeking Habits of Extension personnel

(a) Sources of information

It is unfortunate that age old methods are still largely passed around and practiced with little or no technological innovations, perhaps due to lack of exposure to technological changes. The results show that very few extension personnel (8%) are able to independently search for information in the internet so as to come up with innovations.

(b) Channels Used to Disseminate Information to Farmers

The results indicate that 38% of the extension personnel are unable to enumerate the various possible channels used to further extension services. This situation therefore calls for continuous capacity building and retooling of this cadre.

(c) Use of ICTs for information Communication

- 97.7% of the extension personnel own radios and listen to programmes but lament that the programmes are basic and mainly on commercial marketing of products and services.

- The government, therefore, should consider to make them more pro-active in the design and recording of the radio programmes so as to avoid information deluge and confusion to the farmers. Similarly, the same should be done for TV programme.
- Although the use of the mobile phone for extension is commonplace, more advanced platforms could be developed to enable farmers with smart phones to access pertinent information independently.
- It is evident that the internet is rarely used as a source of agricultural knowledge and or information. More marketing of this body of knowledge would be vital.
- Regarding the accessibility of agricultural films/videos, only 29.4% of the respondents indicated that they have access to films/videos even though AIRC produces them for dissemination of information to the public. This is a clear sign of ignorance on the part of the extension personnel. Increased financing and aggressive marketing of AIRC products is therefore paramount.
- As for the awareness of ICT-Based Community Information Centres (telecentres), only 16.7% said that they know about telecentres.

3#Collaboration with Agricultural Organisations and Institutions

The extension personnel cited Kenya Agricultural and Livestock Research Organization (KALRO) Regional Centre in Embu County and other local Non – Governmental Organisations (NGOs) as the key collaborators. However, failure to mention information services offered by Agricultural Information Resource Centre (AIRC), a division of the Ministry of Agriculture, Livestock and fisheries is a clear indication that the extension personnel are not nationally and internationally fully exposed to the immense world of agricultural information.

4#Effectiveness of Extension Services Provision

Although 20% of the extension personnel claim to provide information to farmers effectively, while 12% said they are readily available to sort farmers' information needs, several challenges were cited which include difficulties to traverse the areas allocated to them due to the burgeoning farmer population. The extension personnel: farmer ratio is very low resulting into offering a demand driven service via Common Interest Groups. A more personalized service would be ideal in satisfying farmer information needs. Adoption of the ICT based Telecentre as modeled by Zaman (2008) would facilitate a more personalized service in addition to other services like the Farmers' Field Days.

5#Discordance in Agricultural Information services

Discordance in the way the various sources of agricultural information such as the extension services, commercial input stores, government corporations, top agribusiness and agricultural companies in Kenya and libraries among others may be a derailment to the farmers.

6.0 Recommendations

To mitigate the variously noted impediments to efficient and effective delivery of extension services, the following need to be implemented;

- Incessant in-service trainings for extension personnel not only on farming methods but also on other pertinent issues such as public relations and communication skills are critical for quality extension service.
- Improvement of the farmers' information literacy skills via continuous training workshops and seminars, subsidised by the government would be ideal.
- Streamlining, coordinating and monitoring of the extension service given to the farmers from both private and government organizations in order to avoid mediocrity and farmer confusion as to what to adopt.
- Leveraging of the synergies between the agriculture and manufacturing sector in order to not only increase productivity but also add value to products while creating more employment.
- Adopting technological innovations in food production and marketing would not only give the farmers an incentive to increase production but would also ensure regional as well as national sustainable economic development.
- Mechanising of agricultural processes so as to attract the youth to the agricultural sector.
- Paradigm shift from linear relationship of the agricultural researchers, extension personnel and the farmer to the tripod one where reciprocity is enabled - educational levels notwithstanding.

- Investment in the current agricultural information infrastructure (libraries, resource centres inter alia) is critical for knowledge and innovations creation.
- Establishment of multipurpose community agricultural information centres (telecentres) run by agricultural information scientists and within reach of rural farming communities cannot be overemphasised. Both farmers and extension personnel in this study applauded this idea of a one-stop-shop, even at cost. It would form a vital referral centre in each village where all agricultural information needs would be met promptly.
- There is need to expedite equitable access to relevant and timely agricultural information and or knowledge to all stakeholders within the agricultural sector ranging from researchers, extension agents, information scientists, planners and policy maker inter alia.

7.0 Conclusion

Even though 77.1% of the farmers in this study indicated a great appreciation of the extension services so far being offered, there is an immense room for improvement. Capacity building of all stakeholders in agricultural extension, adoption of cutting edge ICTs, creation of a well co-ordinated national information and knowledge repository for all to tap from is vital.

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