MULTIMEDIA UNIVERSITY COLLEGE OF KENYA

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"Good information is in short supply"

Kenyan Farmers and their assessment of information on agricultural innovation

Results of a joint research project "Shortcomings of communication in agricultural knowledge transfer in Kenya – and ways to improve it"

Final Report, August 30, 2013

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Executive Summary

This research project addressed specifically the information-seeking behaviour of small scale farming households in Kenya. It focused on how farmers are informed about innovation on new methods of increasing agricultural productivity, which is one of the main challenges for Africa's agriculture and its rural population. Shortcomings in Information are presumed to be one essential element that might hinder the up-take of new methods that are made available by agricultural research. For this purpose a survey with 600 small-scale farming households was conducted, investigating the information needs and patterns.

The main results of the survey point to (a) the dominating role of radio as the main media channel used by almost all farmers for receiving agricultural information - and much less the mobile phone that is thought by Western donors and NGOs to be the new information tool (b) the high credibility of Government extension services as the most trustworthy source regarding agricultural information although farmers bemoan the fact that extension officers are difficult to reach and less available than expected, and (c) the apparent gap between what farmers need and what they get in two respects: They mainly get technical information, for example on new varieties, planting methods or new crops, but they also want more information on markets, gaining more income and more basic knowledge. They prefer to receive information as a comprehensive package and not isolated bits. Secondly, they prefer another mode of getting information, not the usual top down approach with little explanation, but a comprehensive mode which provides them with various options accompanied by a lot of explanation. Surprisingly, many farmers say that they lack even basic knowledge of good agricultural practice.

Based on these findings, it can already be recommended to develop new concepts for communication with farmers where radio plays the central role, and with critical journalists who can engage with extension officers and researchers. A media mix around radio can then complement the different information needs of farmers. And it is obvious that research itself needs to develop a strategy concerning how to communicate with farmers directly when extension services are limited in terms of scope and finance as currently in Kenya.

Nevertheless, there are open questions regarding the effects of information, which can now be posed much more directly. The findings and the initial feedback received from agricultural stakeholders point to the need to investigate the very content of information provided by radio and extension services to farmers, and the information flow (and losses) between research and extension itself. The final essential question concerns the mix of media exposure and personal communication (extension officer, farmer groups etc.) that increases the probability of farmers' uptake of new technologies.

1. Introduction

The challenges to global agriculture are many and complex, as it has not only to produce more food for a world's growing population but at the same time protect the environment, mitigate agriculture's effects on climate change, realize pro-poor growth, reduce inequalities and improve food security, especially for the one billion people that still suffer from food insecurity and malnutrition (Pretty et al. 2010: 220).

The need for a productivity revolution in smallholder farming is urgent (World Bank 2007: 1; FARA 2006: 8). Details for achieving these goals are under discussion but there is consensus that agricultural research plays a crucial role, as does the availability of new technologies and a successful knowledge transfer/sharing between researchers and farmers for achieving those productivity gains. (FARA 2006: 14; Kimaro et al. 2010: iii)

However, the current literature on the need for increasing agricultural productivity reveals the remarkable fact that despite the acknowledged importance of successful communication amongst different actors and target groups for achieving change, the very content, the quality and other characteristics of that information have hardly been researched at all. This has been recently highlighted by Glendenning et al. 2010, who explained that it is still not understood why marginal and smallholder farmers do not access information about innovative technology more frequently (ibid.:4) and who demand more research to better understand the information needs and marginal farmers' information-seeking behaviour. The World Bank study of Kenya's extension efforts (1999: 4) has pointed to the need for information to be adequate and responsive to farmers' needs and suggested that shortcomings in information to farmers might be a major hindering factor for adoption of innovations by farmers. However, other Kenyan studies in this field have so far failed to look at information and communication in any detail (Rees et al. 2000; Muyunga et al. 2006). Interviews held with agricultural researchers and other experts in Kenya confirm that there are not many details known about the information flow between research, extension and farmers beyond the fact that information is often irregular, not systematically supervised and often not sufficiently specific for farmers.[1]

The current study aims to start to fill that gap between the abundance of agricultural research in East Africa developing new technologies, with Kenya as a centre, and the dearth of uptake of those technologies by farmers. This behaviour might have a wide range of explanations, information difficulties being one of them. As a case study, our research investigated the information behaviour of Kenyan small scale farmers, strictly from a farmer's point of view.

Consequently, the main goal of this study is to inform agricultural research and extension services in Kenya and beyond. The study carries recommendations that should hopefully enable agricultural extension efforts to focus information and communication on farmers' needs, preferred channels, and modes of communication.

The research has been financially supported by grants from Mercator Foundation Switzerland and from the Rectors' Conference of the Swiss Universities of Applied Sciences.

[1] Interviews were held between February 2012 and July 2012, see list of interviews in Annex. One interviewee said: "good information is in under-supply. It is too little".

2. The Kenyan context

The following chapter introduces some essential context information on Kenya in order to enable a reader not familiar with the country to better understand later sections.

Economy and agriculture

Although Kenya is the biggest and most advanced economy in East and Central Africa, it is still a poor developing country with a Human Development Index (HDI) of 0.519, putting the country in position 145 out of 186 – one of the lowest in the world. Approximately 38% of Kenyans live in absolute poverty (Business Daily). The economy has seen tremendous growth in the last decade with a boost in the service sector, mainly in telecommunication and financial activity. Services are now contributing 62% to Gross Domestic Product (GDP).

Nevertheless, agriculture is the mainstay of the Kenyan economy, directly contributing 26 per cent of the GDP and another 25 per cent indirectly. According to the Agricultural Sector Development Strategy 2010-2020 (Government of Kenya 2012: 1-2), the sector accounts for 65 per cent of Kenya's total exports and provides more than 18 per cent of formal employment and more than 70 per cent of informal employment in the rural areas. Agriculture plays a significant role not only as a sector that needs to contribute to the overall 10 per cent growth target, but also to reduce inequality and poverty as explained in the recent World Bank report (World Bank 2013). It says that poverty is still quite high, but Kenya has the opportunity to eliminate extreme poverty by 2030 if growth is accompanied by a reduction in inequality, to enable the poor to benefit, to a disproportionate extent, through new economic opportunities. It is recommended to the government to "*address poverty by investing in poverty reduction strategies focused on job creation and enhanced productivity of smallholder farms*[2]*, strengthening cash transfer programs and targeted public spending programs to improve quality of education, water, sanitation and access to electricity for the poor in the rural areas.*" (World Bank 2013)

Kenya's agriculture comprises predominantly small-scale farming (up to 3 ha). This small-scale production accounts for 75 per cent of the agricultural output and 70 per cent of the marketed agriculture produce. This section produces for example over 70 per cent of Kenya's main staple food maize, 80 per cent of milk and 70 per cent of beef. (Republic of Kenya 2010: 11-12)

Agro-ecological zones

Agro-ecological zones were established in Kenya by the Food and Agriculture Organization (FAO) in 1978. It defines seven zones on the basis of combinations of soil, landform and climatic characteristics (FAO 1996; Farm Management Handbook 2007). The country is divided into three main production zones when rainfall is used as a basis (Republic of Kenya 2010: 9). The high-potential zone (with high rainfall above 1000 mm annually), the medium potential zone (with 750 – 1000mm rainfall) and the low potential zone (mostly semi-arid and arid zones with 200 – 750 mm rainfall). Our sample was designed in a way to represent these agro-ecological zones.

[2] Highlighted by authors of this report

Administrative setting

Kenya is currently divided into 47 semi-autonomous counties that are headed by governors who were elected in the first general election under the new constitution in March 2013 (map in Annex). These 47 counties now form the first-order divisions of the country. The number of counties was established by a high court ruling in September 2009. Under the old constitution, Kenya comprised eight provinces each headed by a Provincial Commissioner (centrally appointed by the president). The provinces were subdivided into districts.
However, our sampling for this study could not be based on the new administrative set-up, but had to be based on the data of the Census of 2009 (KNBS 2010). This census was structured according to the then valid administrative set-up with 158 districts[3]. Districts are sub-divided into "divisions" and those in turn into "locations", and "sub-locations". Evidence shows that those sub-locations usually contain 500 to 1500 households, making them suitable as a base for our survey.

The media in Kenya

Media ownership in Kenya falls under government media, private media and community media. The government owns the oldest broadcast radio and television stations, the Kenya Broadcasting Corporation (KBC), which was established in 1928, during the colonial period. KBC operates two national services which broadcast in two national languages, Kiswahili and English separately. The English service also transmits the broadcast to schools, an educational content jointly produced by the Kenya Institute of Education. Besides the national services, KBC runs regional services which broadcast~~s~~ from Kisumu (Western, Nyanza and part of Rift Valley), Nyeri (Central, Eastern and Mount Kenya regions) and Mombasa (Coastal region). These regional services are offered in several local languages which share the daily slots equally. Several new FM stations have been opened which broadcast in the following local languages (KBC 2013): Kalenjin, (Kitwek FM) Kisii (Minto FM) Dholuo (Mayienga FM) and Maasai (Nosim FM). Kenya has 42 ethnic languages and some of them, especially those representing large communities, have many FM stations using their languages.

Commercial and private media in Kenya became vibrant after the liberalization of the media in 1992. With this, several media entrepreneurs were licensed to operate (Odero and Kamweru 2000). There are five commercial television stations: NTV, (owned by Nation Media Group), KTN (owned by the Standard Group), Kiss TV (owned by Radio Africa Ltd), Citizen TV (owned by Royal Media Services) and K24 (owned by Media Max Ltd). The other television stations that are widely accessible include Christian television~~s~~ stations such as Family TV (owned by TBN), Hope TV, Sayare TV and Adventist TV. Pay TV and Cable TV are also widely accessible in the urban areas.

All of these media companies also run several FM radio stations, in Kiswahili and vernacular languages. Some of the stations cover only Nairobi County, while others, especially those who broadcast in local languages, reach far-flung counties. There are slightly more than 90 radio stations operating in Kenya with about 46 broadcasting in Nairobi County. Kisumu has 21, Nakuru 26, and Nyeri 17 (Media Council of Kenya 2013).

Currently, there are four main daily newspapers publishing in Kenya. All of the newspapers are part of larger media companies that own either television station or radio stations. The Daily Nation is

[3] The number of districts was often changing and increasing between 2003 until 2009 (The daily Nation 2009)

published by the Nation Media Group (NMG), a publicly listed company. The Aga Khan is the largest shareholder and founder of the NMG. The Standard is published by the Standard Group, the People Daily by Media Max Ltd and the Star is published by Radio Africa Group (Kemunto 2013).

Although Kenyan audiences have a wide range of media outlets to choose from, they are heavily fragmented. Audience habits and patterns vary widely and they expose themselves to more than one channel per day. However, Kenya's media audiences use radio most, followed by television and newspapers (Oriare et al. 2010).

3. Theory, Objectives and Research questions

This research project was theoretically embedded in the uses-and-gratifications-approach. According to this model, media users will seek and process information only when they perceive that the information will be relevant and useful to them. This is one of the basic results of media effects research (Rubin 2009; Sparks 2006). Empirical evidence underlines the principle of selectivity both in information seeking and information processing.

In this research project the focus was on information seeking and less on information processing, as it was the first step to understand the information behavior of small-scale farmers. Consequently, the design of the questionnaire was tailored to ask for factors that are decisive for information seeking, such as accessibility to and availability of information, issue involvement, perceived need for information, perceived social pressures to be informed, but also for personal factors like risk acceptance, risk avoidance and innovation readiness.

The research's main objective was to better understand the entire information and communication environment around increasing agricultural productivity with the focus being on rural, peasant and/or small-scale farming households. Attention was given to the frequency and quality of information, its appropriateness and shortcomings.

In this regard, the study investigated farmers' information needs (demand side), took stock of what information is delivered to farmers (supply side), and tried to assess its quality by farmers' own assessments, by investigating the following questions:

- What kind of information do farmers and their households actually get/look for - from what sources (research, media, extension, friends and other farmers) and in what frequency?
- What are the information needs of farmers, perhaps differentiated for various farmers' groups (farm sizes) in different farming systems (market-oriented, subsistence only) regarding increasing agricultural productivity and new technologies
- Of what quality (against the background of farmers' needs, interest and capacity to understand) is that information? What barriers and hindrances are there? How do farmers themselves assess the quality and appropriateness of this information?
- What are the main shortcomings within the information and communication process and what improvements are necessary?

4. Methods and Procedures

4.1 Methods

It should be mentioned at the outset that this study was primarily focused on the small-scale farmer. In other words, an effort was made to look at information around agricultural innovation from the farmer's side, i.e. the demand and reception side, not from the supply side.

Thus, at the heart of our research was a representative survey with 600 Kenyan small-scale farmers from 12 different locations in the three main agro-ecological zones of Kenya.

The questionnaire has been developed in a series of steps and with a variety of methods. Firstly, various semi-structured interviews were held with representatives of Agricultural Research Institutes (ILRI, KARI), Farmers Associations (KENFAP), agrochemical industry (Syngenta), media organizations with agricultural programmes (KBC) and NGOs working in the field of enhancing Kenya's Agriculture (Scratch Africa, World Vision). The aim was to provide critical information on the information environment of Kenya's small-scale farmers, embedded in efforts to enhance agricultural productivity (see list in Annex).

Secondly, one focus group discussion with farmers was held in one community in Machakos, with the aim of understanding the specific communication environment of rural farmers, especially the information flow between farmers, government, extension services and research institutes.

Thirdly, inquiries with agricultural universities were made and a literature review conducted on sampling methods within research on Kenya's agriculture.

Sampling

The institutions to be interviewed for the preparation work (4.1) were not randomly selected but through already existing personal contacts. Finally, eleven institutions were contacted. The focus group was organized through personal contact with an Agricultural extension officer in Machakos area, one of the home regions of a Kenyan researcher.

However, for the representative survey the farmers were randomly selected through a multi-staged process. In order to save travel and field costs it was decided to use a cluster approach, the clusters being specific districts in Kenya. To produce the desired results, the sample drawn for the study needed to be representative of the main agro-ecological zones in Kenya, which are the main production areas (high, medium and low potential according to the zoning of FAO, see chapter 2).

The sampling also facilitated the differentiation between locations close to and far away from market centres. Thus, it was decided to firstly select six districts in Kenya[4] according to their main agricultural potential (two for high, two for medium, and two for low agricultural potential) to represent the variety of farming conditions in Kenya. This yielded the following sample (Table 1).

[4] The list of districts was taken from the publication of the Census 2009.

Table 1: Selected districts

Potential	Districts	
High	**Nyeri North**	**Bungoma East**
Medium	**Nakuru**	**Siaya**
Low	**Machakos** (semi-arid)	**Makueni** (very arid)

Once the districts were selected, a random sampling procedure was adapted within the district to select two divisions in each district, based on the list of divisions in the Census of 2009. Within those selected divisions, the field researcher used another random procedure to select the sub-location, where the field researcher and his/her assistants had to go and conduct the survey. Within the selected sub-location a random route walk was applied to select the households to be interviewed (see Annex for details). Finally, 12 divisions and sub-locations were selected. In each of them 50 interviews with farmers were to be conducted (see section 5.1 for list)

Design of survey

Based on the main research questions the questionnaire contained mainly questions about the following items:

- Socio-economic and other data for household and farm size
- Media use and information patterns in general
- What media and other sources are used for actually receiving information about agriculture?
- Assessment of agricultural information received so far
- Needs around agricultural information (design in Annex)

The questionnaire was filled out by interviewers in a face-to-face situation with randomly selected farmers.

4.2 Procedures

The actual work was divided into four phases.

In the preparation phase from February to August 2012

- A kick-off workshop with all researchers from both universities was conducted to get the final work plan agreed upon (2 days, February 2012, 22 and 25)
- The sampling of districts and divisions was done (see 4.1 and Annex)
- Interviews with researchers , extension agents and editors of mass media programmes were conducted (interview results were documented, see list in Annex)
- The design of the questionnaire and the method of linking research questions with survey questions were intensively discussed
- The questionnaire was developed in an intensive reviewing and revising process between IAM and the MMU research team, based on results of explorative interviews, focus groups discussions and local knowledge of MMU staff. The questionnaire was fine-tuned in various

versions; the last one was then tested in Kangundo, 30 km East of Nairobi, Machakos county with ten farmers. Based on the insights generated in the test, the questionnaire was again adapted due to length and translation difficulties between English and the vernacular. After the first ten "real" interviews the questionnaire was again slightly changed, but these were minor alterations.

- Researchers were trained in conducting the survey with farmers

The field work phase was done from August to December 2012, consisting of

- pre-field work visits by MMU researchers to all divisions selected, mainly for making public authorities aware of the research to be conducted and to find agricultural officers to work as stringers. Additionally, MMU researchers became familiar with the region, and could organize accommodation etc. for the actual field work. These stringers were to accompany MMU researchers during the field work and helped greatly with "opening the doors" to get access to farming households. The results of these pre-field work visits were documented.
- conducting the field survey, which was tedious as one team (researcher plus stringer) could do at most 6 to 7 interviews per day (random walk in agricultural surroundings, many farmers were not present during the day). That difficulty was felt by the first field team and led to a re-organization. Instead of one team (2 people) doing an entire division (50 interviews) three teams were deployed, and additional research assistants trained and engaged to conduct the field work more speedily. Finally, all interview data were complete by December, 15, 2012.
- Developing a coding scheme for transforming survey data into Excel and SPSS data.

The assessment phase took place from January 2013 to May 2013, consisting of

- training students in filling in survey data into Excel (half day)
- filling in survey data into Excel files
- developing an SPPS file
- training in SPSS methods
- cleaning of data
- analysing and jointly assessing survey data with SPSS
- qualitative assessment of parts of the survey (Open questions)
- report writing

Based on the findings various dissemination events took place in July 2013:

- conducting final workshop of research partners (July 5, 2013)
- feedback to agricultural producers, media and Ministry of Agriculture (July 8, 2013)
- feedback to agricultural research institutions (July 9, 2013)

Further dissemination is planned via

- conference papers (3rd East African Communication Association, October 2013)
- articles in reviewed journals
- distributing the report to academics and agricultural research institutions
- submitting further research proposals inspired by above feedback

5. Results

5.1 Sample

Our sample consisted of 612 filled questionnaires from selected divisions. Table 2 shows the characteristics of the sample with regard to agricultural potential, distance to markets, and with the specific sub-locations where the research took place.

Table 2: Overview sample and field work

District	AEZ Potential	Division	Distance from Centre	Location	Sub-Locations	**No.**	Interviewers
Makueni	***Low*** *Arid*	*Kaiti*	Closer		*Nzuuni, Kyuasini, Mukuyuni Utaati*	1	Ndeti Ndati
		Kitise	Far away		*Kituluni, Kiangini Kiteei*	2	Ndeti Ndati
Nyeri North	***High***	*Kieni East*	Far	*Naro Moru*	*Ndiriti*	3	Ben Mbugua Christoph Spurk Simon Nyamu
		Kieni West	Close to Nyeri	*Mweiga*	*Bondeni, Amboni Njengu, Endarasha*	4	Isaac Mutwiri Christoph Spurk Richard Kakumbura Agnes Muthoni
Machakos	***Low*** *Semi-Arid*	*Central*	Close (10 km)		*Nduu, Mutituni Kivuthini*	5	Nancy Booker Ndeti Ndati
		Kalama	Far (25 km)		*Muumandu Lumbwa*	6	Nancy Booker Ndeti Ndati
Nakuru	***Medium***	*Baruti*	Close (urban)		*Mogoni*	7	Sylvia Macchini, Gladys Kemunto Siles Kemunge Don Eshush
		Solai	Far (Rural)		*Maji Tamu*	8	Sylvia Macchini Gladys Kemunto Stephen Njirguka Tito Wandai
Bungoma East	***High***	*Wembuye*	Close to road		*Shitikho*	9	Wilson Ugangu
		Ndivisi	Far away			10	Bernard Owour
Siaya	***Medium***	*Karemo*	Close to town	*South Alego*	*Masumbi*	11	Collins Wagumba, Fred Omondi, Ajwang'a s., Ben A.,
		Ugunja	Far away	*Central Ugenya*	*Ambira*	12	Fred Omondi, Collins Wagumba, Mark Sanka, Irene Akoth, Omondi D.

5.2 Characteristics of farming households in our survey

Gender

The gender distribution in the sample is quite balanced. Out of the 612 questionnaires 51% were conducted with women, 46% with men, and the remaining 3% with couples.

Table 3: Gender of interviewees

Interviewee	No.	Per cent
Men	283	46%
Women	310	51%
Both (couple)	17	3%
Total	**612**	**100%**

Divisions and District

The number of interviews was evenly distributed among the six districts and 12 divisions – i.e. around 50 per division and 100 per district, with minor deviations as the total number of interviews was 612, not exactly 600 (Table in Annex).

Age structure

The sample comprises mainly older people, at least in comparison to the young age pyramid in Kenya. According to the World Fact book (CIA) 42% of the population is below 15 years old, the median age being 18.9 years. This reflects the fact that young people don't work as farmers yet as they will only later get access to land.

Table 4: Age of interviewees

	No.	Per cent
Up to 30	116	19%
31-40	153	25%
41-50	148	24%
Older than 50	195	32%
Total	**612**	**100%**

The "above 50" sub-group is almost a third of the sample. One impression from the field work was that a considerable number of elderly people go back to the rural homes after retirement and (re-) start agriculture. There are hardly any differences in gender according to age groups. Only the "young" age bracket (up to 30) comprises more women (57%) than men (41%).

Household size

The average household size is 6.1 family members, but shows a considerable variation (table 5).

Table 5: Household size

Size	No.	Per cent
Small (1-3)	83	14%
Medium (4-6)	312	51%
Large (7+)	212	35%
Total N	**607**	100%

Position

Most of the interviewees (85%) were the owners of the land, i.e. making the decision on what to do on the farm. 12% were caretakers relying at least partly on decisions by owners. The rest had other arrangements. (see Annex)

Education level of interviewees

39% of the farmers in the survey had no formal education or had only attended a few years of primary school. We assume that means only a very low level of literacy. The next group comprises those having completed primary schooling and attended a few years of secondary schooling, i.e. they should have a sound literacy level. They comprise 35% of the sample. The last group represents 26% and consists of those having completed secondary or even higher levels, like college (53) or university (8), i.e. undoubtedly a level of literacy.

Table 6: Formal Education level

Level	No.	Per cent
None and/or primary incomplete	232	39%
Primary complete and/or secondary incomplete	213	35%
Secondary complete or higher	158	26%
Total N	**603**	**100%**

Income

Considering that rural households usually have various sources of income, the survey sought to discover what types of income were generated by the household. The result is quite clear: income from farming is almost always present (95%) but other types of income complement it, among them income from business, salaried employment or support from relatives.

Table 7: Sources of income and frequency *(Multiple answers)*

Income from…	No.	Per cent
Farming	579	95%
Business	114	19%
Salaried employment	77	13%
Other	42	7%
Support from relatives	65	11%
Total	**603**	

Also the question regarding the main income reveals clear results. 87% of interviewees said their main income was farming, 13% mentioned other sources as main ones. We also computed whether there are differences in main income (farming or other sources of income) between the age groups, but there weren't any.

Farm size

The sample confirms an insight already presented by Jayne et al. (2010). There is a considerable differentiation and imbalance within the segment of small farmers. Almost 30% of respondents in our survey were farming on less than 1 acre, whereas a tiny 9% had 5 acres or more.

Table 8: Farm size by area

	No.	Per cent
Less 1 acre	173	28%
1 – 2.4 acre	246	40%
2.5 – 5 acre	138	23%
5.1 – 10 acre	39	6%
10 acre or more	15	3%
Total	611	100%

Farm size is correlated with the agricultural potential. Arid and semi-arid zones have a larger share of bigger farms (5.1 acres and more, see Annex) than the other areas. Makueni has 25% bigger farms and Machakos 11%, whereas in other districts this share ranges from 0 to 7%. This seems to be quite natural as farmers in arid regions have to compensate with size for the much lower potential of their land.

It was also noted that that farm size does not correlate with household size. A considerable proportion of large families (one third) is found in all farm sizes groups, i.e. also in very small ones. Scarcity of land affects also large families.

Type of farming

Almost 25% of respondents did mainly crop farming (without animal husbandry of any kind) whereas 75% did mixed farming, i.e. crops plus animals.

Size of animal herd

The differentiation in area size of the farm is also reflected in the size of the animal herds. We computed the number of different animals held in a farm into Tropical livestock units[5] to be comparable. Around 30% of farmers have less than 1 TLU and 7% have 5 TLU or more.

[5] The tropical livestock unit (TLU) is equivalent to 250 kg animal life weight. It was computed according to Ghirotti (1993), Conversion factors were 0.7 for cattle, sheep/goats with 0.1, swine with 0.2, and chicken with 0.01.

Table 9: Farm size by animals

Size	No.	Per cent
Less 1 TLU	144	32%
1 – 2 TLU	96	21%
2 – 3 TLU	95	21%
3-5 TLU	87	19%
5 TLU +	31	7%
Total	453*	100%

*N = 453, as all farmers without animals were excluded here

Staple food or market-orientation

Farmers were also asked about what kind of crops they were growing. For the sake of this study, these crops were classified into staple food and market-oriented[6], bearing in mind that any staple food can be marketed when there is a surplus, which will be given to relatives in need or maybe find its way to the market. Nevertheless, the genuine market-oriented crops are those which are normally not entirely used by the farm household for subsistence, like green peas or onions. These are intended to go to the market (see detailed list in Annex).

Table 10: Staple food only or marketable crops?

Crop type	No.	Per cent
Staple food only	293	48%
Staple food plus marketable crops	317	52%
Total	610	100%

Table 10 shows that there is roughly a fifty-fifty distribution between farmers growing staple food only and farmers growing additional market-oriented crops. That might be interpreted as the distinction between subsistence orientation and market orientation. It might be seen as a proxy for innovation when one tries to plant cash crops. However, we need to bear in mind that some farms might be too small to dare to plant cash crops, at least for farmers with risk aversion.

Work load

Regarding working hours per day, we see that most household members work between 4 and 6 hours per day in the farm. That sounds realistic, as farms are small and there is not more work to do or it is very tedious work in the full heat of the sun.

[6]Explanation of list of staple and market-oriented crops is found in annex.

5.3 Characteristics of divisions

To get a more detailed picture of the districts we were working in we correlated the main socio-economic data with districts. (See tables in Annex “Education according to regions”, “Age according to regions” and “Farm size according to regions”)

From those data we see that Siaya is apparently the most disadvantaged district. It shows the highest figures in low education (10 percentage points more than average, see table in Annex “Education according to regions”), is older (43% respondents over 50 versus 32% on average, see table in Annex “age according to regions”) and has the highest proportions of very small farms (33% with less than 1 acre against 28% on average, and 52% of 1-2.4 acres, against 40% on average, see table in Annex “Farm size according to regions”). The other regions show disadvantages in specific variables (farm size), but do not combine several of them, i.e. they can compensate in other categories (for example with education level). Nakuru, for example, does not perform well in education level, but compensates for that on the farm size by area.

From all of the above data, we presume that our sample is quite robust and representative of the small-scale farming households in Kenya. However, it must be said that Kenya has no country-wide agricultural statistics for farm size, education level and age structure of its farming population.

5.4. Information behaviour of small-scale farmers

The survey provides us with a clear picture of farmers' access and use of various media channels, both for general and for agricultural information.

Access to media

Radio is still the favourite channel for farmers. 95% of respondents had radio access. Thus, radio is by far the single most important media channel for sharing information with small-scale farmers. TV has a share of 28%, and print is quite rare in rural areas. Only 14% of respondents had access to newspapers, and 5% to magazines. But two thirds of respondents had access to a mobile phone, which is almost exactly the average of mobile phone penetration in rural Kenya, confirmed by other studies.

Table 11: Access to media

Access to…	No.	Per cent of cases
Radio	569	**95%**
Mobile phones	394	**66%**
TV	166	**28%**
Newspapers	82	**14%**
Magazine	27	**5%**
others	27	**5%**
Total	**1265**	

N = 597, 15 missing cases, *multiple answers*

Preferences

The unique position of the radio as a media channel was confirmed by farmers' answers about their preferences (they could name up to three preferences, but most mentioned only one preference). 83 % preferred the radio as a media channel, but only 21% preferred the mobile phone as a media channel. That looks like a large **discrepancy** between the hype – at least felt in Nairobi - about mobile phones and applications for farmers (for example M-Farm, i-cow, i-hub, Sokoni SMS, Kilimo Salama, NAFIS, see Crandall 2012, Mutwiri 2013) and the assessment of farmers themselves.

Table 12: Preferences of media channels

Preference for …	No.	Per cent of cases
Radio	484	83.0%
Mobile phone	125	21.4%
TV	80	13.7%
No preference	53	9.1%
Newspaper	23	3.9%
Magazine	6	1.0%
Total	**771**	

Interestingly, there is a clear pattern between education level and media preferences: The higher the education level, the more TV and newspapers are preferred and the less radio. But still, radio leads by far also in the highest education sub-group with 76%.

There is no differentiation in those preferences by age groups – with the exception of TV being more prominent with people below 40. In addition, there is hardly any correlation between those preferences and farm size – only the largest farmers prefer radio a little less (60%) and newspaper a little more (7%).

Table 13: Correlations between preferences for media channels and education

Preference for…	None / primary incomplete	Primary complete + secondary incomplete	Secondary complete + higher	No.
Radio	83.9%	86.8%	75.8%	476
Mobile phone	15.6%	24.5%	26.8%	125
TV	8.3%	12.3%	23.5%	79
No preference	8.7%	8.3%	11.1%	53
Newspaper	1.8%	3.9%	7.2%	23
Magazine	0.5%	0.5%	2.6%	6
Total	575			

N = 575

Actual media use amongst farmers

Regarding radio, farmers ~~are~~ actually mostly use their local FM stations, according to their naming of the station they mostly listen to. We computed the use of radio stations according to districts. Table 14 clearly demonstrates that in almost every district/region (except Nakuru) there is one dominating radio station, which is usually the local vernacular station. KBC radio and Citizen radio broadcasting in English or Kiswahili play only a minor role in each district, but they are listened to countrywide, almost in every district (except Nyeri North).

Table 14: Actual use of radio stations

District	Radio 1	Radio 2	Radio 3
Makueni	**Musyi – 62%**	Citizen – 14%	
Nyeri North	Inooro FM – 45%	Kameme FM – 23%	Coro FM- 23%
Machakos	Musyi –FM 44%	Mbaetu FM – 21%	Citizen – 16%
Nakuru	Citizen- 27%	Kass FM – 22%	KBC – 18%
Bungoma East	West FM – 39%	Citizen- 22%	Sulwe FM – 17%
Nyanza	**Ramogi FM – 72%**	Citizen – 12%	KBC- 11%

N = 488, 124 missing = respondents did not name any station

What can be additionally seen[7] is that 62% of respondents listen to vernacular stations, and only 36% to English or Kiswahili broadcasting stations (N = 488). We also see that English / Kiswahili Radio is much more used by respondents with higher education, whereas vernacular radio is much more listened to by people who had no formal education or left before completing primary school.

Table 15: Use of vernacular or Engl-Swahili radio by education level

Radio use	None /primary incomplete	Primary c. secondary incomplete	Secondary complete + higher
Vernacular radio	70%	63%	50%
Engl. – Swahili radio	28%	36%	49%
Not known	2%	2%	2%

N = 480

The linkage between respondents and radio seems to be quite well established as roughly one third of respondents could identify a specific programme on the radio. Over 50% of them mentioned farming programmes, 40% general programmes (news, entertainment) and very few (2%) mentioned religious, health or music programmes. That means listening to farming programmes plays an important role in the routine media use.

Amongst the TV stations[8], Citizen TV is the most popular one (11% of respondents) followed by KTN with 3%, KBC (1.6%) and Nation TV (1.3%). Out of those TV programmes, 74% were general, 19% farming programmes and 7% business.

Table 16: Use of TV stations

Station	No.	Per cent
Citizen TV	66	60.0%
KBC TV	10	9.1%
K24	1	0.9%
Kiss TV	2	1.8%
KTN TV	18	16.4%
Nation TV	8	7.3%
Q TV	4	3.6%
UTV	1	0.9%
Total	110	

Newspaper use is very limited. Only 46 respondents named a paper, of whom 35 % named the “Daily Nation”, and 10 (2%) the “Standard”, and only one respondent named the “Star”.

[7] After having identified the language of every station (we were not able to identify for 2%)
[8] only 110 respondents or 18% could name a specific programme, because a large majority had no access to TV

Mobile phone use – calling, texting, applications

The use of mobile phones amongst farmers hardly goes beyond calling and texting. 39% did not use the mobile phone (which is in line with the fact that only 66% had access to it). 42% did use the mobile phone for calling, and 37% mentioned its use for text messages. Only 58 respondents (11%) used mobile phone applications (which include Twitter, Facebook etc).

Table 17: Use of mobile phones

Activity	No	Per cent
None	206	39%
Calling		42%
Text SMS		37%
Apps	58	11%
Total	675	

Multiple answer set, N = 526; 86 missing answers

The use of the mobile phone is correlated to education level - in an expected way. The use of text messages and of Apps is more frequent in the higher education level group.

The utilization of mobile phones is also differentiated according to the location. The divisions of Solai (73%), Ndivisi (63%), Karemo (64%) and Ugunja (61%) had a high share of respondents not using mobile phones. These differences are also evident within the same district. Baruti, which is close to Nakuru town can be regarded as almost "urban" in contrast to Solai, which is also in Nakuru district but very remote. The difference between those two is quite remarkable: 41% of respondents in Baruti used Apps, whereas in Solai they were only 5% (which is 2 respondents).

It can also be seen that in divisions close to centres mobile phones use becomes more sophisticated, i.e. more text messaging and using Apps, than in divisions far from centres.

5.5 Characteristics of information sources for agricultural information

Challenges in Agriculture

Interviewees were asked to name the five most important challenges in agriculture. This revealed the following list of priorities.

Table 18: Challenges in agriculture

Challenges	No.	Per cent of cases
Lack of capital - credit	379	62.5%
New varieties of crops	351	57.9%
Understanding fighting diseases	287	47.4%
Availability of water	286	47.2%
Using fertilizer	244	40.3%
Weather forecast	206	34.0%
Access to markets	184	30.4%
New techniques in farming	176	29.0%
Gaining more income	155	25.6%
Storage	132	21.8%
Transport	104	17.2%
Business ideas	103	17.0%
New breeds in animals	99	16.3%
Others	89	14.7%
Alternative farming systems	58	9.6%
Networking	37	6.1%
	2890	

Multiple answers (up to five per interviewee)

The lack of capital is the most important challenge, as it was named by over 60% of respondents (less in Nyeri and Nakuru with 47%), followed by the challenge of handling new varieties of crops (58%, but much less in Nyeri North, a high potential area). Fighting diseases (47%), availability of water (47%) and using fertilizers (40%) followed as challenges.

The challenges show quite some differences according to the district and a little differentiation according to formal schooling (knowledge challenges were more frequent in the lower education cohort, but no differentiation according to age.

Access to markets was only mentioned in 30% of the cases (but mentioned by 57% in Nyeri North), although many respondents were complaining about the “middlemen”, who in farmers’ view take all the profit. However, the fewer mentions of markets is in line with the even lower importance of transport (17%) and storage (21%). Also fewer people mentioned gaining more income (25%) or getting business ideas (17%) as challenges.

The high priority given to lack of capital and technical issues (seeds, pesticides, water) and lower priority for markets and other economic issues might be explained by the fact of absolute poverty. The first and main concern of many very small farmers in our sample seems to be to nurture their

families and raise the agricultural output for their own consumption (and that of relatives). Only beyond that point does it make sense thinking of markets, developing business and gaining more income. These concerns are apparently not those of the majority of farmers; it seems to be too distant for a considerable number of small farmers. An impression from field work was that many farmers do speak of lack of capital, but are not informed about the very basic of economics of the farm, like simple cost-benefit or gross margin calculations, for example for using fertilizers.

5.5.1 Main sources for information on agriculture

Against the background of those challenges farmers were asked to name the sources they use for receiving information on agriculture from a given list of sources. The main five information sources for farmers are "other farmers and family", "mass media", "government extension services" [9] and "barazas".

Table 19: Information sources on agriculture

Source	No	Per cent
Other farmers	474	78%
Family	409	67%
Mass media	325	54%
Govt extension	306	50%
Baraza	276	46%
…		
Total	675	

5.5.2 Importance of information sources measured by frequency

This analysis was fine-tuned by investigating the frequency of usage of all information sources, ~~having~~ bearing in mind that the more frequently a source is used the more important it is.

We distinguished four categories of frequency which were

- "Never"
- "Rarely" (once or twice in a season)
- "Often" (three to five times a season, a season being three to four months growing period)
- "Very often" (weekly or even more frequent)

That allowed us to reveal very detailed aspects.

[9] Maybe surprising against the background that government services were downsized tremendously in the last decade.

Table 20: Frequency of using various information sources

Frequency of using information source	Very often	High frequency **(often plus very often)**	Rarely **(once or twice a season)**	Never
Family	48.0%	67.5%	20.2%	12.3%
Farmers	48.0%	71.5%	20.2%	8.3%
Mass media	41.3%	58.9%	28.2%	13.0%
Barazas	16.2%	41.5%	30.2%	28.4%
Govt Extension	8.8%	33.7%	33.2%	33.2%
Agrovets	9.9%	31.1%	40.9%	28.0%
Field days	6.5%	28.8%	36.4%	34.8%
Mobile phones	11.0%	24.2%	28.9%	47.0%
Buyers	6.4%	22.8%	31.9%	45.3%
Research	1.7%	6.6%	11.6%	81.9%

Based on table in Annex

If we look at the "very often" category (first column in table 20) we see that direct contact to family and other farmers is strongly used on a weekly or even more frequent basis; the only other information source that can compete in frequency with this is the "mass media", i.e. radio;

If we compute the frequency of the two highest frequency categories (second column in Table 20), i.e. from three to five times a season plus weekly or more frequent), we see that Barazas are used in 41% of cases with high frequency, Government extension with 34% and Agrovets with 31%. In contrast, research is very rarely used by farmers (82% never used it, see column 4 of Table 20) – which is quite natural as knowledge from research is distributed via government extension services, and not directly.

So we see a clear distinction of three layers in the frequency of using information sources:

- The first and most used category comprises Family, farmers and Mass media
- The second most used category is Barazas, Government extension, and Agrovets
- The third category is Field days, mobile phones and Buyers
- The last category is Research, with only 7% using this information source often.

Table 21: Three layers in Importance of information sources by frequency

	Source	High frequency
1st layer		
	Farmer	**72%**
	Family	**68%**
	Mass Media	**59%**
2nd layer		
	Baraza	**42%**
	Government Extension	**34%**
	Agrovet	**31%**
3rd layer		
	Field days	**29%**
	Mobile Phone	**24%**
	Buyers	**23%**
Last	**Research**	**7%**

Looking for differences in this general picture reveals interesting details (see Table 22).

The frequency of using government extension and barazas differs very strongly from one division to the other, in contrast for example with using “other farmers” or “mass media”. Government extension, for example, is mostly used in Kitise, a division in Makueni, (72%, which is even more surprising as this is a very remote area, but maybe with a highly motivated extension service) and hardly never used in Solai (9%) or Ndivisi (11%). Using government extension services shows a great variability over the divisions. This must have to do with the offerings of the local extension offices. Apparently, there are very active extension services and very passive ones. Barazas show more or less the same pattern as Government extension. It looks highly contingent upon the offering. And we can see that the use of barazas is high in locations where the government extension is also highly used.

However, there is hardly any difference according to distance from centres. Only the Agrovets are less used in divisions far from centre, which looks reasonable as farmers have to go the shops, which are usually in centres.

Table 22: Percentages of used information sources with high frequency (often + very often) according to divisions

	1	2	3	4	5	6	7	8	9	10	11	12
	Kaiti	**Kitise**	**Kieni East**	**Kieni West**	**Machakos Central**	**Kalama**	**Baruti**	**Solai**	**Wembuye**	**Ndivisi**	**Karemo**	**Ugunja**
Govt Ext.	47.7%	**72.9%**	**21.3%**	37.3%	28.3%	43.8%	36.7%	**9.3%**	25.0%	**11.4%**	41.9%	23.1%
Agrovet	62.2%	27.5%	32.6%	28.3%	40.4%	33.3%	39.3%	17.0%	15.4%	26.2%	17.5%	28.2%
Radio	52.1%	48.1%	87.2%	71.7%	47.8%	47.8%	53.2%	45.8%	40.6%	62.2%	80.0%	67.4%
Mobile phones	55.6%	35.4%	18.2%	14.3%	33.3%	19.6%	34.8%	2.3%	33.3%	17.1%	6.5%	11.8%
Field Days	34.9%	45.8%	7.1%	21.2%	42.6%	63.8%	34.0%	6.5%	20.0%	22.2%	30.8%	6.1%
Baraza	50.0%	67.3%	**5.0%**	**12.2%**	51.1%	69.6%	48.1%	**23.4%**	35.9%	**26.1%**	57.8%	44.2%

5.5.3 Importance of sources measured by trust

Farmers were asked to name their two most trusted sources as an open answer[10]. After coding the open answers into various categories, we see that the Government agricultural extension service (including their officers and the Ministry) is the most trusted source, 44% mentioned them as such, followed by trust in other farmers. Next come mass media with 30%. Trust in Agrovets is much lower, and trust in NGOs and buyers very low.

Table 23: Most trusted sources *(two open answers)*

Source	No.	Prozent
Agricultural extension /Ministry	270	**44.2**
Farmers	248	**40.5**
Radio / mass media /TV	185	**30.3**
Family	103	**16.8**
Agrovet	101	**16.5**
Neighbours	44	**7.2**
Friends	39	**6.3**
Experts in agriculture	35	**5.7**
Baraza	22	3.6
NGO	10	1.7
Buyers and traders	9	1.5
Field days	8	1.3
Shows	4	0.7
Research Institutes	3	0.5
CBO's	1	0.2
All are trusted	1	0.2
total	612	100

N = 612 Trusted source 1 = 24 missing; trusted source 2 = 108 missing

5.5.4 Active information seeking?

Some farmers are pro-active in looking for information. They approach other farmers and family easily and most often. Next come government extension with 38% and Agrovets with 31% that are most actively consulted by farmers, in contrast to traders/buyers with 8%.

Table 24: Active consulting

Source	No	Per cent
farmers	457	76%
Family	437	73%
Govt extension	227	38%
Agrovets	188	31%
Mass media	67	11%
Buyers		8%
Gesamt		

[10]We did not distinguish in weight between the two sources

Mass media are rarely approached actively, i.e. only by 11% of respondents. Only 9% called up a radio station programme[11]. And only 7% (31 farmers) received agricultural information via mobile phone and the applications for agricultural information. The actual contacts mentioned were:

- Agricultural dealers
- Agricultural officers (4)
- Agro-chemical company
- Baraza's alerts on fertilizer
- Chiefs
- EADD (East African Dairy Development)
- Facebook (2)
- Friends
- Internet (2)
- Other farmers
- Safaricom (2)
- Synovate doing research on dairy farming
- Traders (2)
- Twitter (11)

The list shows that genuine applications for farmers (M-Farm, I-cow, Kilimo Salama) were hardly mentioned here and thus rarely used. Most contacts look like personal contacts, not applications. We derive from these responses that the use of mobile phone applications is very limited in the entire small farmer population. This is confirmed by Mutwiri 2013, who provides us with evidence that most farmers in his study use mobile phones mainly for social contacts, for making appointments or getting very distinct information bits like market prices but not for receiving complex agricultural information.

5.5.5 What kind and mode of information?

Most Information farmers are receiving is within the categories of “basic information”, “how to do”-information, “when to do” and “how to prevent” (over 50%) ; much less is on circumstances of agricultural production or “how to sell” (25%). Information on capital or credit and future opportunities (12 and 18%) is even less frequent.

We see from Table 25 that the supply side of information – at least as perceived by farmers –has a strong focus on the “technical” side of agriculture, and much less on the “economic” side (markets, capital, future opportunities). That is not to say that technical information should not be published or broadcast, but it should not be at the expense of farm economics, which looks just as important as farm practice.

[11]Stations used for calling in were Inooro, Citizen, Musyi FM and Ramogi.

Table 25: Kind of information

Kind of information	No	Per cent
Basic info	360	**62.2%**
How to do?	355	**61.3%**
When to do?	320	**55.3%**
How to prevent?	302	**52.2%**
Circumstances	149	25.7%
How to sell?	158	27.3%
Future opportunities	102	17.6%
Credit info	71	12.3%
Other	33	5.7%

N = 579 cases, 33 missing

Mode of information

We also discovered that in almost 50% of cases the information is given in the "top-down" mode ('Do this or that') or only with a little explanation; in the other half of cases the information is given with a lot of explanation (37%) or even providing various options (14%) for the farmer to choose from.

Table 26: Mode of information

Mode	No.	Per cent
Top down	149	**26%**
Little explanation	127	**22%**
Lot of explanation	209	**37%**
Delivers different options	81	**14%**
Total	566	100%

One can see two different models here. The first two options can be seen as "following recommendations" and the other one as "understanding recommendations". It would be interesting to see what mode of information works better for taking up research results differentiated for kind of information and kind of farmer.

Interestingly, there is no correlation between mode of information and farm size. Only in divisions that are distant from centres is the information ~~is~~ more top-down and less with explanation.

5.5.6 Assessment of information by farmers

Small scale farmers were asked how they asses the information they are getting, in terms of timing, quantity, usefulness, trust and comprehensibility. The analysis shows that there are problems in timing and quantity, i.e. more than 40% of respondents find the information inadequate in timing and insufficient in quantity. On the other hand the assessments for usefulness, trust and comprehensibility are very positive and well over 80%.

Table 27: Assessment of information - Summary

Information is…	No.	Per cent
Adequate in timing	591	56.2%
Sufficient in quantity	594	58.1 %
Useful	591	80.9%
Trusted	591	84.6%
Easy to understand	586	82.9%

5.6 Information needs

The positive assessment of the information farmers are getting is – surprisingly – not in contradiction to the very strong expression of the need to get more information. The survey contained a list of information options in specific fields and farmers could choose whether they see it as "very important", or "less important" or "not at all important" to get more information from that field or topic. The answers overwhelmingly indicated a significant need for more information in almost every sector.

Table 28 provides information about the priorities in terms of needs. There are some surprising results here:

- Over 80% see a strong need for basic knowledge information in agriculture – which contrasts with the commonly shared understanding that the African farmer has a traditional knowledge of basic agriculture and good agricultural practice.
- Over 80% need more information on how to use fertilizer, seeds and pesticides. – which shows that farmers still need to know more about the issues they are already dealing with.
- 71% want more information on markets – compensating for the fact that they receive little information on markets so far (see Table 25)
- 82% need more information on "gaining more income" – apparently in contrast to what they are so far getting (little information on credit, future opportunities) – but they need it urgently.

Table 28: Information needs *(Share of „Very important" category in different fields)*

Over 80% "very important"	70 – 80%	Below 70%
Seeds	Breeds	Business ideas (63%)
More income	Market	Credit info (54%)
Fighting diseases	Storage	Alternative farming systems (64%)
Using fertilizer and pesticides	Weather rainfall	
Basic knowledge	New techniques	

There is hardly any correlation between these priorities in information needs and farm size. The only thing we observe is that the medium size farmers amongst the small scale farmers (2.5 to 5 acres), seem to be keen to know more, especially about markets, more income and storage.

But there are some differences amongst the divisions. Siaya has considerably lower percentages in the information needs, especially on markets, storage or income and business ideas. In our view this can easily be explained by the special conditions in Siaya, being a division with a higher share of elderly people, less formally educated and with smaller farm sizes.

These results are strongly backed by the open answers farmers gave when asked what problems they have with information or what kind of information they were missing[12]. There was a wide array of issues missed:

- Basic agricultural knowledge and practice
- Capital access and credit
- Production methods, management, and technologies
- Diseases, pests, and fighting them
- Soil, water
- Weather and other environmental factors of agriculture
- Ideas and opportunities

It was also said that often information was not sufficient, not understandable, not in time or not adapted. Some mentioned that information was not dialogue-oriented.

We can also discover the information needs of farmers from another angle, as we gave them the opportunity to tell us in open answers about examples of good information they received. The answers yielded a lively account of all kinds of examples.

Good information refers to all crops farmers grow. Mostly it concerns improvements of already on-going farming activities of any kind (fertilizer use, new seed, certified seed, pest control, feeding and rearing of cattle and chicken) plus introduction of completely new crops or rearing animals.

From the responses it was evident that farmers appreciated what was novel. For example a number of them appreciated information on crops that they had not planted in the past. These crops included mushrooms, water melon, Napier grass and various types of fruits. A number of them stated that they had never thought of growing these crops but when they were told about them and planted them, their yield was good and so were the sales. Farmers also found information on rearing different types of animals valuable. Several farmers now keep rabbits and this is a recent innovation for most of them and it is yielding results in sales and food production. Hence many consider this information on rabbit rearing to be valuable information. It is obvious that farmers across the country appreciated any information that translated into positive results upon implementation.

[12] There were two opportunities in the questionnaire to express these concerns: these were ‘what is the main problem with the information on agriculture you currently receive?‘ and ‘what kind of information in agriculture are you missing?’

That can also be seen when farmers talked about the type of innovation they have been involved in (see later section), which comprised new products, new markets, but also new or improved methods and practices. Enlarging farming area was also considered as an innovation.

5.7 Preferences of farmers

We also asked farmers about their preferences for various characteristics of information.

Mode of information –Comprehensiveness

We asked farmers for their preferences regarding the mode of information. The results are a strong plea for comprehensive information, i.e. most farmers opt for more explanations and accompanied by various options.

Table 29: Preference for comprehensiveness

Options	No.	Per cent
One option without explanation	32	**5.5**
One option plus little explanation	52	**8.9**
One option with a lot of explanation	138	**23.5**
Delivers different options	364	**62.1**
Total N	566	100

62% of farmers say they want information with various options and lot of explanation. Additionally, 24% of farmers say that they prefer a lot of explanation even if there is only one option presented. So, these two sub-groups request ~~at~~ in-depth information with a lot of explanation. Only 14% prefer straight information with or without explanation.

If we compare these indications of preferences with the reality we see significant differences (comparing Table 29 with Table 26).

Table 30: Comparison in what farmers get and what they prefer

Mode of information	Actual mode (Table 26)	Preferred mode (Table 29)	Difference in per cent points
Top down - One option	26.3	5.5	**+20.8**
Little explanation – One option plus little	22.4	8.9	**+13.5**
Lot of explanation – One option with large explanation	36.9	23.5	**+13.4**
Delivers different options – Various options	**14.3**	**62.1**	**minus 47.8**

The comparison tells us that farmers are getting far too much only one option, and what they lack is different options. 62% of farmers prefer that mode but only 14% are getting it.

How to receive information

Farmers have strong preferences regarding the way they want to receive information. They mostly prefer personal information by visits or by field days (over 80%). Then comes radio with 52%, but also written material is favoured by almost a quarter of participants. As one farmer said: *"You like to carry something home after a field day, because you can't memorize everything."* (farmer in Bodoni, Kieni East).

Table 31: Preferences of information reception

Preferences	No.	Per cent
Personal info	523	**86.2%**
Field visits	492	**81.1%**
Radio	316	**52.1%**
Mobile phones	162	**26.7%**
Written material	145	**23.9%**
TV	114	**18.8%**

There are differences according to regions. The disadvantaged district of Siaya has the highest preference for radio, and the lowest for all other items.

Timing of information

Farmers could choose three options about the timing of information. Almost all farmers (96%) mention that they prefer to receive information before planting. Additionally more than 60% prefer it when a problem or an incident comes up during season. Only 10% prefer information shortly before the harvest. (see details in Annex)

Priority list

1. 96% prefer info before planting.
2. 64% during season when there is a problem or an incident
3. 10% before harvest

5.8 Innovation in small-scale farming and information patterns

Raising agricultural productivity depends on a variety of factors, and it is almost unquestioned that the personal readiness for innovation plays a role. Therefore we tried to find out what innovation types can be found in our sample

We asked farmers whether they were in some way innovative last season (e.g. an improvement in methods, or growing a new product) and whether they are planning any innovations next season[13]. Out of the two variables we tried to cluster farmers in strong, medium and non-innovators.

[13]There are also very frank answers: " I got so much useful information but I never implemented any"

Innovation

More than half of farmers (54%) have introduced an innovation in the last season, and 62% plan to introduce an innovation for next season. Based on these results we looked at how many farmers are on both sides, i.e. have introduced and at the same time plan another innovation, and how many farmers have executed only one of those options.

From that analysis we see that 22% have done nothing on innovation (non-innovators), 40% have introduced an innovation or are planning one (medium innovators), and 38% have introduced one and plan a new one for next season. We call the last group the "strong innovators".

Characteristics of strong innovators

Those strong innovators – a very interesting group for agricultural research to be taken up – are mostly found in the high potential areas of our study, i.e. Nyeri North and Bugoma East; in arid and semi-arid regions (ASAL) there are far fewer strong innovators. That means that strong innovators are really missed in these areas.

Strong innovators have a different media use. They use the mass media much more than the medium and non-innovators on a weekly basis. This difference in mass media use is the strongest difference in frequency of using information sources with regard to innovation type. For example in using extension services and Agrovets there are hardly any differences between medium and strong innovators but for mass media the difference between all types of innovators is exceptional (see Annex table).

Interestingly, the information needs do not differ between strong innovators and the others. However, they are a little more cash crop oriented. Non-innovators grow more staple food and strong innovators go more for cash crops.

Table 32: Innovation type and high frequency of media use

High Frequency of using information source	Not-innovators	Medium innovators	Strong innovators	Differences btw. group
Family	73.6%	64.5%	64.9%	small
Other farmers	76.9%	72.8%	69.7%	small
Govt Extension	23.1%	35.9%	33.2%	medium
Research	2.5%	9.7%	3.8%	
Agrovets	23.1%	30.4%	33.7%	small
Buyers	24.8%	18.0%	20.7%	Small
Mass media	**39.7%**	**56.2%**	**65.4%**	**High**
Mobile phones	14.0%	24.4%	21.6%	Small
Field days	21.5%	28.6%	28.4%	Non
Barazas	39.7%	44.7%	36.5%	
Total	121	217	208	546
	22%	40%	38%	

Based on table in Annex

Additionally, innovation does depend on education level. The non-innovators are most frequent in the low education group. Also, the more education, the slightly more innovation that is introduced.

Risk

We also tried to identify different risk types by two variables; one was asking what farmers actually do after receiving information, and the other one was about their general attitude to risk. The answers (Table 33) were quite clear in that almost 32% of farmers then start inquiring about implementation, and 23% will implement it at the next opportunity. That tells us that about 23% of farmers are ready to implement an innovation, and another 33% thinks or inquires about implementation. In total, roughly half of farmers seem to be active and interested regarding new issues in agriculture.

Table 33: Usual activity after receiving information

Activity	No	Per cent
think about it	265	44.5%
atell family, friends and discuss	278	46.6%
talk to local experts and ask further questions	72	12.1%
inquire about ways of implementing	117	19.6%
decide to implement it at the next opportunity	135	22.7%
Total		145.5%

596 cases, 16 missing; multiple (two answers out of 5).

We additionally inquired about the attitude to risk by offering a list of 8 items (of which they could choose 3) as their normal reaction to information about new issues in agriculture. We then grouped those items into four attitudes to risk:

- Risk averse/very sceptical
- Rather cautious
- Medium risk taker
- High risk taker

Table 34: Attitude to Risks

Answer items	Attitude	No	Per cent
we cannot afford new techniques due to lack of market	**Sceptical**	101	17%
we cannot afford new techniques due to lack of credit			
I do not pay much attention to new things in agriculture			
We should not dare to change things			
Talk to other farmers first	**Cautious**	397	67%
I look what other farmers do and copy them			
test it on a small piece of land	**Medium risk**	394	66%
test it on large scale	**High risk**	41	7%

Per cent of cases – multiple answers, a single case can be in various attitudes

We see that the majority of farmers (66%) is in the cautious section (looking at what others are doing, talking to others first) and/or in the medium risk (testing it on a small piece of land), which is a

good condition for innovation. However, a considerable proportion of farmers is very sceptical ~~to~~ about risk (17%).

However, there is not a clear-cut correlation between innovation and attitude to risk. Although – as expected – the high risk-takers are more inclined to be strong innovators (57% of them belong to the strong innovators category), there are even strong innovators in the sceptical attitude group (34% of sceptical farmers are strong innovators). That could indicate that the actual attitude to risk doesn't prevent people from sometimes being innovative.

The risk type does not apparently influence the use of different information sources. Mass media use and use of government extension is quite uniform for all risk types. What differs is the use of Agrovets and buyers (more used by high and medium risk takers). Additionally mobile phone services are more used by those groups. And the high and medium risk takers are much more interested to be informed about business ideas, markets, credit and alternative farming – and, surprisingly, about basic agricultural practice. It is this group who focuses more than the others on economic issues of farming.

Interestingly, the attitude to risk is hardly related to education; only in the low education level do we find more risk adverse types.

We conclude from that comparison that it is more convincing to look at the actual behaviour regarding innovation than at attitudes to risk.

6. Conclusions and Recommendations

From the findings listed above we can draw the following major conclusions.

Radio is by far the media channel mostly used by small-scale farming households in Kenya for receiving agricultural information. The mobile phone is much less used for receiving agricultural information although it is regarded by Western donors and modern NGOs as being the new media channel for farmers. On the contrary, any communication to farmers that wants to reach a large audience needs to be built around the radio and an appropriate media mix (newspapers, brochures, mobile services) can then complement the information supply by radio.

Our study shows as well that the Government extension is by far the most trusted source among information providers regarding agriculture. That doesn't mean that farmers are content with those services. Mostly they criticize the reduction of public extension services and complain that extension officers are difficult to approach. But the quality of the information provided by the government is unquestioned.

Looking at the above two conclusions it can be said that extension officers should use the radio and that radio stations and their journalists should integrate extension officers as credible sources for information, but critically.

A third conclusion is striking. There is a huge gap between what farmers get and what they want. This is in two respects: First, they mainly get technical information, for example on new varieties, planting methods or new crops, but they also want more information on markets and gaining more income, i.e. economic issues. Surprisingly, many farmers say that they lack even basic knowledge of good agricultural practice. Farmers prefer to receive these two types of information (technical and economic) as a comprehensive package, not in isolated bits. Secondly, farmers prefer another mode of getting information, not the usual top down approach ("Do this!") with little explanation, but a comprehensive mode which provides them with various options accompanied by a lot of explanation.

This resembles what we know from the needs of the general public in democracy. People – and farmers as well – like to be informed so that they can make their own decisions. They don't like to be told what they should do or think. Thus the agricultural journalist has more or less the same role as the general journalist, i.e. enabling decisions but not prescribing decisions.

Based on our findings it can be recommended to give radio a central role in communication to farmers and to integrate the extension service in a critical way. Information needs to be localized, just in time, specific and at the same time useful and implementable. And radio needs regularity. That requires that agricultural journalists that are knowledgeable of farming issues and of farmers' needs work in those radio stations. Only then can they enter into a useful dialogue with extension officers and researchers.

It is also obvious that research itself needs to develop a strategy as to how to communicate with farmers directly when extension services are limited in scope and finance, as currently in Kenya.

However, our research points to a range of open questions that can now be posed much more directly. The first one is the need to investigate the very content of information provided by radio and extension services to farmers more intensively and to assess how deep, appropriate and

diversified this information is. There is the assumption that a lot of information in radio is guided by the commercial interests of advertisers and not by farmers' needs, and that the quality of information suffers from that linkage.

Additionally, the information flow between research and extension itself needs to be investigated. Researchers presume that a lot of useful information gets lost or is not taken up by extension. Thus, the information chain between research and farmers is broken.

Our study also points to the overarching interest expressed during dissemination events by Government, Extension Services, and Research institutions: the essential question is what mix of media exposure and personal communication (extension officer, farmer groups etc.) increases the probability of farmers' uptake of new technologies. Our study can be a first step towards clarifying these relationships.

ANNEX

A-I Randomization

Random sampling I (divisions)

We made a list of divisions in the selected districts (according to the census data of 2009). Divisions were picked by applying random numbers. (The random numbers were the birthdays of Christoph and Isaac without zeros. So it was 182575972.)

Randomizing was done by counting through the list of divisions (one random number after the other) until every district was completed with two divisions. (Leaving out those districts where already two divisions had been picked). The process delivered the divisions marked below in bold italics.

Makueni

Kaiti x

Kee

Kihungu

Wote

Kathonzein

Kithuhi

Mariduni

Kitise x

Machakos

Athi River

Central x

Township

Kathiani

Kalama x

Nyeri North

Keni East x

Keni West x

Mathira

Nakuru

Minicipality

Kampi Moto

Mbugoini

Baruti x

Ngata

Solai x

Rongai

Bungoma East

Webuye x

Ndivisi x

Nyanza/ Siaya

Boro

Karemo x

Uranga

Ukwaha

Ugunja x

Yala

Wagai

Random sampling II (sub-locations)

1. The agricultural officer in the division listed all sub-locations in the area with a strong smallholder share. This generated a list of the names of these sub-locations.

2. The agricultural officer was asked for his/ her birthday, for example 16-12-1976. Then the diagonal sum of this row of figures was computed:

1+6+1+2+1+9+7+6 = 33.

Then **33** was the random number.

3. The list of sub-locations was counted from the first to the last and from up again until the number 33 falls on a specific sub-location. This is the sub-location selected.

4. Then the random walk was to start at a central point in this sub-location (= school, church, shopping centre}.

Random sampling III (random route)

Starting point

The starting point can be a main junction in the village. If there is more than one structure/house on that junction/place, we select the house whose entrance door is darkest in colour. We start from that house with the walk (we stand as if we have just left the house through that door).

Selection of households: every third

While walking, every household seen or identifiable (only on one side of the road) is counted. Every third household is selected. If there is more than one household on a compound, they all need to be counted (the one on the entrance of the plot first, the ones in the backyard second). If there is nobody to interview in that household selected, the surveyors continue counting, and select the next third household.

Random route

You stand on the road - the selected house/structure on the starting point behind you as if you have come out of that house. From there you start counting and

1. You go left and start counting immediately until the first possibility to turn right.
2. There you go right and go on the right side of the road (and counting) until the first possibility to turn left.
3. There you turn left and go to the left side of the road. Continue with the next possibility to turn right (step 2) and so forth

Rule: if you turn right, go to the right side, if you turn left, go to the left side

If you come to a dead end or border of district:

Go back on same side of the route (now without counting the households) until the next possibility to turn to the correct side. From there you start counting the households again.

A-II Design of survey (with respective question numbers in brackets)

DATA on Independent Variables ↓	**DATA on Dependent Variables →**			
SOCIO-ECONOMIC FARM SPECIFIC TYPE	MEDIA USE for **GENERAL INFORMATION ACTUAL**	Media and other sources for **RECEIVING AGRICULTURAL INFORMATION** - **ACTUAL**	**ASSESSMENT** of actual agricultural information received	**NEEDS** in agricultural information
General: o Age (4) o Education (7, 8) o Gender (2) o Language (5) o Household size (11) o Owner/caretaker (6) Importance of farming: o Time in farming (16) o income share (10) Size of farm: o acreage (12) o crops (14) o animals (15) o type (9, 13) Typology regarding o Communication (23, 45) o Innovation (41, 42) o Risk (43) Challenges (16)	Media channels used? (18) Preferences (19) Names of mostly used media channels (20)	Receiving from what sources (both personal and media sources) (21) Frequency of using those sources? (22) what kind of information is received? (25) what do people do with info? (26) Actively seeking information? (23, 24)	Trust in sources? (27, 32) Main problem with agricultural info? (28) Assessing adequacy regarding o timing (29) o quantity / frequency (30) o usefulness (31) o difficulty (33) o explanation degree (34)	Timing of agric. Info (35) Subjects/topics of agric. Info Importance of subjects (36) Missing info? (37) modality of information (38) preferred channels of info (39) example of useful info (40)

A-III Scheme for distinction staple food and market-oriented crops

Staple food	Market-oriented
Maize	Ground nuts
Beans	Tomatoes
Cassava	Onions
Millet / sorghum	Cabbages
Potatoes	Kels = sukuma wiki
Bananas	Macademia
Sweet potatoes	Cowpeas
Peas	Sugarcane
Manaug	Beetroot
	Paw paw
	Oranges
	Carots
	Coffee
	Wheat
	Fruits

A-IV Farm size according to regions

farm_size * district_level cross tabulation

			district_level						Total
			Makueni	Nyeri North	Machakos	Nakuru	Bungoma East	Siaya	
farm_size	less than 1 acre	number	8	26	26	54	26	33	173
		%	7.8%	25.7%	26.8%	49.5%	25.2%	**33.3%**	28.3%
	1- 2.4 acre	Number	34	43	38	37	43	51	246
		%	33.3%	42.6%	39.2%	33.9%	41.7%	**51.5%**	40.3%
	2.5- 5 acre	Number	35	26	22	14	26	15	138
		%	34.3%	25.7%	22.7%	12.8%	25.2%	15.2%	22.6%
	5.1- 10 acre	Number	21	6	6	4	2	0	39
		%	20.6%	5.9%	6.2%	3.7%	1.9%	0.0%	6.4%
	above 10 acre	Number	4	0	5	0	6	0	15
		%	3.9%	0.0%	5.2%	0.0%	5.8%	0.0%	2.5%
Total		Number	102	101	97	109	103	99	611
		%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

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A-VI - Interviews with agricultural experts

Institution	Person	Date	Interviewer
KARI Kenya Agricultural Research Institute	Dr Felister Wambugha Mvoi Makini, Deputy Director Outreach & Partnerships	August, 1, 2012	Mwara
National Bee Station	Abraham Biwott, Officer in Charge for Research	July, 12, 2012	Mwara
Scratch Africa Agriculture Centre	Ms Naomi Mungai, Associate Director	June , 1, 2012	Mwara
World Vision Kenya	Emmanuel Fondo, Project Manager	June, 27, 2012	Mwara
University of Nairobi Department of Agriculture	Prof. Levi Shadeya-Mudogo Akundabweni, Agricultural Production Systems Agronomist	June, 19, 2012	Bernard Owuor
Jomo Kenyatta University of Agriculture and Technology	Dr. David Kagima Director, Extension & Technology Transfer Research, Production & Extension Division	June, 19, 2012	Bernard Owuor
ILRI, International Livestock Research Institute, Nairobi	Dr. John Recha, Research Specialist with Climate Change, Agriculture and Food Security (CCAFS)	February, 27, 2012	Ugangu and Spurk
KENFAP Kenya Federation of Agricultural producers	Lucy Mwangi, head of programs Peter Mwangi,	February, 23, 2012	Ugangu, Keel, Schanne and Spurk
Syngenta Foundation Nairobi	George Osure, Country Manager	February, 22, 2012	Schanne; Keel and Spurk
The Organic Farmer	Peter Baumgartner and Peter Kamau, editors	February, 22, 2012	Schanne and Spurk
KBC Kenya Broadcasting Cooperation	Toepista Nabusoba, KBC radio manager Farm programme Mali Shambani	March, 1, 2012	Spurk

Map of Kenya - Counties