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ICTs for Agricultural Extension: A study in Ratnagiri district of Maharashtra, India

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Abstract

This study describes an assessment of attitudes of farmers from the Lanja tehsil of Ratnagiri district of Maharashtra in order to understand the information seeking behavior and reasons for the farmers seeking this agricultural information through different sources. To meet the objective of the study, a structured questionnaire and interviews were conducted to gather information on number of aspects related to the use of Information and Communication Technologies (ICT) from 100 randomly selected framers. Additional semi- structured questionnaire and checklist was provided to the key stakeholders. The farmer based questionnaire sought demographic data, information requirement data and uses of ICT data. Key stakeholders were also asked similar information and information related to their job position, their work experience and what further knowledge they would require to improve their work performance. This paper reports on the analysis of demographic data, educational qualification, family background, income range, land ownership, use of ICT, source of getting information, belief on the sources of getting the information and the information required by the farmer. The study provides an insight into information needs of the villagers and their attitudes to whether the information may facilitate better decision making about their agricultural activities.

Keywords: Agriculture, Farmers, Information and Communication Technologies (ICT), Information Dissemination.

Introduction

Information Communication Technologies (ICT) plays a key role in disseminating a wide range of information and advice, leading to knowledge and attitude change among rural communities. It also supports rural communities to acquire new skills and create new employment opportunities (Malhan et al. 2007). Realizing the importance of ICT, governments have introduced a number of ICT programs and projects which may benefit the rural communities of India. ICTs also play an important role in agriculture, as information assists farmers in their decision making process. It could be considered that the most effective tool for any farmer is information to acquire knowledge and make decisions based on that knowledge (Armstrong et al. 2011).Various factors like weather conditions, practices employed by farmers, soil parameters and other external parameters, influence agricultural production. This makes the decision making process all the more challenging (Armstrong et al. 2010). In the past, farmers used to make decisions on the basis of their observations. Recently, farmers have started using technology for improving their agricultural practices.

The use of ICT has proved to be useful for improving crop production (Armstrong et al. 2012a). However, according to the Situation Assessment Survey of Farmers conducted by NSSO, nearly 60 per cent of Indian farmers do not access any information on modern technology from any source. Primarily, the task of providing agricultural information to farmers is vested by government office extension system. For India, the responsibility for developing, refining and disseminating the latest technologies is performed by the network of Indian Council of Agricultural Research (ICAR) Institutes, State Agricultural Universities and Krishi Vigyan Kendra (KVKs) across the country. In addition, extension activities are also carried out by state agricultural departments, private agri-business companies and NGO's. Mass mediated broadcast and telecast supported by trained agricultural extension personnel at the field level form the backbone of the agricultural extension system of India. With the adoption of ICTs, agricultural extension is expected to become more diversified, knowledge-intensive and demand-driven and thus more effective in meeting farmers' information needs (Gelb et al. 2008). The introduction of ICT such as personal computers and especially mobile phones for many rural areas has continued to increase in recent years. A number of studies have examined the use of ICT tools by agricultural industry stakeholders (Kalusopa 2005, Mwakaje 2010).Other factors that have been found to impact on the effectiveness of adoption of ICT by agribusinesses include language and traditional constraints (Jain et al. 2010, Aleke et al. 2011). Other research in Malaysia by Hassan et al. 2011 found that "ICT plays an important tool to expose rural community to development". With rural leaders perceiving the benefits of ICT and adopting the use of ICT.

The inevitability of connectivity to mobile phones, internet, and other wireless devices is due to a number of factors, including decreases in costs, increases in competition, and expansion of infrastructure (The World Bank 2011). Several efforts are put in the direction of making ICT devices and services more affordable in ways that also extend access to small-scale producers. Mobile phones are now in the forefront of ICTs in agriculture. By the end of 2011, over 6 billion mobile phone subscriptions or more accurately, subscriber identity module (SIM) cards are used worldwide as indicated by ITU Telecom database (The World in 2011, ICT facts and figures). The ability to purchase a low-cost mobile phone is complemented by the expansion in telecommunications infrastructure; most countries now have more than 90 per cent of their population served by a cell phone signal, including coverage in rural areas.

For communities where broadband is too expensive for individuals to use on their own, telecentres or other community-based facilities can provide Internet access. Internet access is also expected to increase through the continued rollout of third- and fourth-generation (3G and 4G) mobile networks that greatly improved capacity for carrying data. Smart-phones, such as blackberries, Samsung or iPhones, which include 3G mobile services with remote Internet connection, will increase access to information even to poor farmers.

Since the beginning of the 21st century so far the number of mobile cellular subscriptions on global basis has grown exponentially from around 18 per 100 inhabitants in 2001 up to 95 inhabitants in 2014 and still continues to grow. Also the mobile based broadband connections have grown exponentially from 5 per 100 in 2007 to 32 per 100 connections in 2014. However on the other hand the fixed telephonic and the wired broadband connections have been very less at below 20 per 100 inhabitants (Global ICT Developments, 2001-2014, ITU World Telecommunications / ICT Indicators Database).

This paper will examine the preference for ICT by Indian farmers given the proliferation of ICT and mobile devices. It provides an examination of relationships between various factors like age, gender, qualification, land ownership, gender, preference on use of ICT and source of information with respect to use of ICT. It will also provide an insight into information needs of the villagers and theirs attitudes to whether the information may facilitate better decision making about their agricultural activities. The paper will report on a case study from the Ratnagiri district of Maharastra. Findings from this case study have also been reported previously by Armstrong et al. 2012b and Armstrong et al. 2012c. The following section will detail the previous findings related to the Ratnagiri case study.

Ratnagiri Case Study

The Ratnagiri case study which is the focus of this paper has been reported by Armstrong et al. 2012b and Armstrong et al. 2012c. Armstrong et al. 2012b suggested that the main factor to determine whether the farmer can access ICT tools is related to how much income they earn, followed by land ownership which would allow for greater probabilities to earn higher income to use for such purchases of ICT tools.

Armstrong et al. 2012b also concluded that the correlation between age and the use of ICT tools found not to be significant. That study reported that the age group from 41-60 years has a higher usage of the majority of ICT tools compared with participants from the remaining age groups. TV and mobile phones had the highest preference in all the age groups. Overall, the use of mobile phones was preferred over TV by all the age groups.

Other findings reported by Armstrong et al 2012b, concluded that the correlation between qualification and the use of ICT tools was performed was also not significant. The results show that most of the farmers are not highly educated. TV was used more by the farmers with primary and high school qualification. It was also found out that this group did not know how to operate computer and hence internet as well. This group was relying on mobile phones to a great extent. The results also indicate that respondents with no qualification most of the time used TV as a source of getting information else did not use any ICT tool.

However, other results reported by Armstrong 2012b found a significant relationship between income and the use of the ICTs. The results prove that this is the main factor to determine whether the farmers can access the ICT tools. Purchasing new ICT tools is possible only if the income level is high. The results indicate that larger percentages of the respondents are earning less than 5000 rupees/month. It was observed that due to the low income level, majority of the farmers are using traditional techniques for agricultural activities (Armstrong et al. 2012b). Similarly, the relationship between gender and the use of ICT tools was not significant. The gender was not making any significant difference in the use of ICT tools. However, some trends showing that women farmers were more likely to use no tools compared to the men farmers, (Armstrong et al. 2012c).

An analysis of the correlation between land ownership and the use of ICT tools was performed on the same case study by Armstrong et al. 2012c, was found not to be significant. The results show that larger percentage of the farmers who owned their land were more likely to use internet and less likely to use no tools.

An examination of the correlation between preference of ICT tool and the use of ICT tools was performed on the same case study by Armstrong et al. 2012c. It was found that majority of respondents have their own ICT tool and were using for agricultural practices. However, TV and mobile phone is majorly used ICT tool by the farmers of that area. Also farmers differed in their actual preference for some of the other tools such as Internet and use of computer.

The objective of the this paper is to further examine the results from the case study by making an assessment of the farmers agricultural information seeking behavior and the reasons for seeking agricultural information through certain sources/media by the farming community will be made. The study collected and analysed the variety of available information based on age, gender, land ownership and qualification. This paper reports on the analysis of demographic data, educational qualification, family background, income range, land ownership, use of ICT, source of getting information, belief on the sources of getting information and the information required by the farmer. An insight into information needs of the villagers and theirs attitudes to whether the information may facilitate better decision making about their agricultural activities is discussed.

Background

Study Area

The Ratnagiri district is 8,208 sq. km geographically. It is bordered by the Sahyadri Hills on the East and Arabian Sea on the West. It is located in the south-western part of Maharashtra state on the Arabian Sea coast of India. It is situated between north Latitude 17^{o} and east Longitude 73^{o} 19'. It is the portion of the larger band known as Konkan. It has coastline of 237 km. The district was considered representative of the state's agricultural sector (Konkan.org 2014). Ratnagiri district has nine tehsils; Mandangad, Dapoli, Khed, Chiplun, Guhagar, Sangameshwar, Ratnagiri, Lanja and Rajapur. The study was conducted in Lanja Tehsil of Ratnagiri District in state of Maharastra, India. The main rivers of the district are Shastri, Bor, Muchkundi and Kajali. The principle farming of the region consists of rice, especially in the talukas of Khed, Chiplul, Sangameshwar, Rajapur and Ratnagiri. The eastern parts grow nachani and yari. The Ratnagri district has coastal climate with a monsoonal rainfall pattern (Anon 2014).

Research Methodology

A randomly selected group of farmers from the Lanja tehsil of the Ratnagiri district were surveyed using a structured questionnaire to meet the objectives of the study. The number of participants was 100 farmers. In-depth interviews were also conducted with the 100 farmers to gather information on the use of ICTs. Each participant was asked to sign a consent letter and informed that their responses will be treated with anonymity. A separate questionnaire was provided to the key stakeholders i.e. government officials and agricultural industry workers. General demographic data, education level, household income, agricultural activities, use of ICT tools, kind of ICT tools, preference of ICT tools, source of getting information, belief on the sources of information, preferences for the types of information, frequency and timings of its delivery were the main questions in the farmer based questionnaire. Their responses related to the credibility and applicability of the information they received, the kind of support that was available and their overall expectations from the use of ICT tools was recorded.

To meet the objectives of the study a focus group meeting was conducted with regional and district level officials, policy makers, ICT service providers, NGOs, key informants and other

relevant stakeholders. This group was provided with semi-structured questionnaires and checklist. They were asked same questions as the farmers group and additional information related to their job position, their work experience and what knowledge they need to acquire to improve their performance was also recorded. Additionally the stakeholders shared the challenges that they face while acquiring the agricultural information and their opinion on improving information delivery.

Results

Demographic Analysis

Population of Lanja Tehsil is close to 1 lakh as per census of India 2011, (Government of India, Census 2011). Out of the 100 randomly selected respondents, 79% were men and remaining 21% were women. An analysis of the age of the respondents indicates that 22% belong to the age group over 61, 10% in the age group 56-60, 11% in the age group 51-55, 13% in the age group 46-50, 12% in the age group 41-45, 8% in the age group 35-40, 13% in the age group 31-35, 7% in the age group 26-30, 4% in the age group 21-25. No one was found below the age of 20 performing agricultural activities in the tehsil which suggests that they may be pursuing formal education, or other casual work.

The table below indicates that majority of the men after the age of 40 are involved in the agricultural activities, whereas, of the sampled women the majority of women involved in agricultural practices within the tehsil were in the age group from 31-35.

Table 1 Men and Women respondent in different age groups

Age Group (in years)	Men	Women	No. of respondents
14 -20	0	0	0
21-25	2	2	4
26-30	5	2	7
31-35	7	6	13
36-40	6	2	8
41-45	10	2	12
46-50	11	2	13
51-55	10	1	11
56-60	10	0	10
over 61	18	4	22
Total	**79**	**21**	**100**

Educational Qualification Analysis

With respect to the educational levels it was found that 81% of the respondents were literate and remaining 19% of the respondents did not take any education. Out of the 81% literate respondents, 25% had completed primary education, 19% high school education, 25% S.S.C, 7% H.S.C, 4% bachelor degree and 1% master degree. The table below indicates the fact that majority of the men and women farmers have qualification till S.S.C.

Family Background Analysis

Over 95% of the respondents were found to be married with the remaining 5% not married. In terms of, number of family members, 44% of the respondents had more than 5 members in the family, followed by 25% with 5 members, 22% with 4 members, 8% with 3 members and 1% with 2 members in the family. No respondents were found with sole member in the family. With respect to the number of dependent family members, 43% of the respondents had more than 5 dependent members in the family, 25% with 5 dependent members in the family, 22% with 4 dependent members in the family, 9% with 3 dependent members in the family and 1% with 2 dependent members in the family. No respondents were found with 1 dependent member in the family. The table below clearly indicates that majority of the families in the study area has more than 5 members in the family and also more than 5 dependent family members which builds up the pressure on the earning members of the family.

Table 2 Men and Women respondents with various qualifications

Qualification	Men	Women	No. of respondents
Primary School	17	8	25
High School	17	2	19
S.S.C.	23	2	25
H.S.C.	5	2	7
Bachelor Degree	3	1	4
Master Degree	1	0	1
Total	**66**	**15**	**81**

Table 3 No. of family members and no. of dependent family members

Count of members	No. of Family members	No. of Dependent family members
1	0	0
2	1	1
3	8	9
4	22	22
5	25	25
more than 5	44	43
Total	**100**	**100**

In terms of, number of family members involved in the agricultural practices, 67% of the respondents reported that more than 5 members of the family were involved, followed by 2% for 5 members of the family, 4% for 4 members of the family, 3% for 3 members of the family, 6% for 2 members of the family and 18% for 1 member of the family.

Income Range Analysis

With respect to their average monthly income levels, 51% of the respondents reported to have income less than 3000Rs., followed by 21% in the range 3001-5000Rs., 9% in the range of 5001-8000Rs. and 8001-10000Rs., 3% in the range of 10001-15000Rs., 4% in the range of 15001-25000Rs. and 3% having income more than 25000Rs. The above fact proves that most of the farmers are not earning sustainable levels of income.

Land Ownership Analysis

An examination of farmers land holdings found that 89% of the respondents own or rent 4 acres or less and only 11% farmers have greater than 4 acres land. The majority of farmers 87% of them have their own land while 9% rent and 4% have a combination of own and rental. The table below shows the facts.

Table 4 Land holdings in acres with respect to Ownership and rental

Area in acres	Ownership (O)	Rented (R)	O & R	No. of respondents
4 or less	76	9	4	89
5-10	4	0	0	4
11-20	3	0	0	3
21-30	2	0	0	2
31 or more	2	0	0	2
Total	**87**	**9**	**4**	**100**

Agricultural Activity Analysis

Regarding the agricultural activities it was reported that 91% of the farmers in the sample are growing rice, 19% nachani, 16% mango, 14% coconut, 12% cashew nut and also other crops like chickoo, vari, bananas, beans, lemon and vegetables. It was also reported that 52% farmers keep livestock like cattle and 19% poultry.

Use of ICT Analysis

In terms of usage of ICT services, 87% of the farmers had access to one or the other ICT tool and the remaining 13% had no access to any of the ICT tools. Many mobile phone networks like BSNL, Airtel, Vodafone, Tata-Docomo were available in the study area. It is evident that farmers in low scale except for TV and mobile phone are currently using all the ICT tools. However, farmers differed in their actual preference for some or the other tools such as Internet and use of Computer.

Table 5 Actual use of ICT and preference to use ICT

ICT Tools	Actual usage of ICT	Preference to use ICT
TV	72	89
Radio	9	11
CD/DVD player	5	19
Home Phone	25	39
Mobile Phone	71	89
Computer	8	30
Internet	8	46

Source of Agricultural Information Analysis

Respondents were asked to inform the sources of agricultural information. 97% of the respondents received information from neighbors or fellow farmers, 94% from government officers, 68% from newspapers, 29% from extension workers, 4% from related websites and 2% from magazines. No information was received by the private company and sales agents. The relationship between the source of information and the belief on the source was analyzed, 94% of

the respondents believed the information given by the government officers, followed by 86% on neighbors or fellow farmers, 73% on newspapers, 34% on the extension workers and then on the remaining sources of information. It is evident that farmers in high scale believe the information received by the above three sources and the remaining sources are still not that active in the study area.

Table 6: Source of information and the belief on the information

Source of Information	Using the information	Belief on the information
Neighbours	97	86
Local Council	1	5
Extension Workers	29	34
Private Company	0	4
Sales Agents	0	2
Government Officers	94	94
Related Websites	4	13
Newspapers	68	73
Magazines	2	3

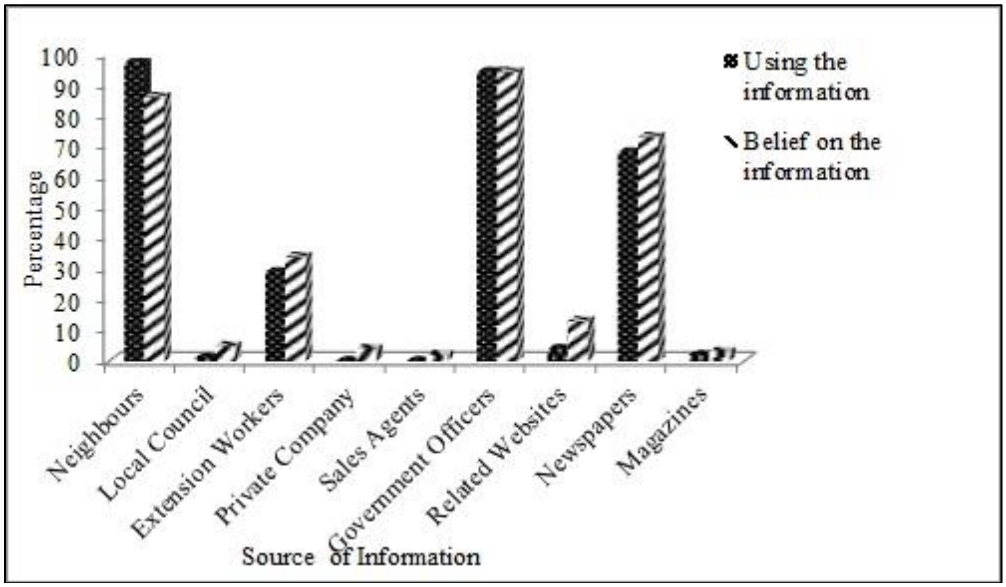

Fig. 1 Source of information with respect to Farmers belief in the information

Information Need Analysis

In terms of information required 92% of the respondents reported that they wanted information related to the use of insecticides and 91% for the use of fertilizers. Other information requested included weather forecasts by 67%, market prices by 32%, organic farming by 26%, soil improvement & testing by 14%, pest management by 11%, financial management by 8%. With respect to the frequency in which they would like to get the information, 70% of them reported to get the information weekly, followed by 18% fortnightly, 11% daily and 1% monthly. The preferred timing to receive this information was evening 6-9 pm as per 56% respondents, followed by 17% between 9-11 pm, 16% between 4-6 pm, 8% from 1-4 pm, 3% from 10 am-1 pm and none of them wanted the information between 6-10 am.

Discussion and Conclusions

This study reported on the agricultural information seeking behavior of farmers in the Ratnagiri district of Maharashtra state, India. For these farmers, lack of information can become a constraint for productivity. This study explains the reasons behind the use of certain media – including ICTs by the farmers over other available resources. It was observed that, though farmers have access to a wide range of sources, they mostly believed the information received from government officers, fellow farmers, local news papers and extension workers for agricultural information. Among the ICTs used, TV was widely used and preferred for seeking information for better agricultural productivity. Following TV, the next ICT used and preferred was mobile phone. Farmers showed lot of interest in adopting new technology and getting more relevant and timely information. The farmers also showed interest in getting more information via internet, computer and the home phone.

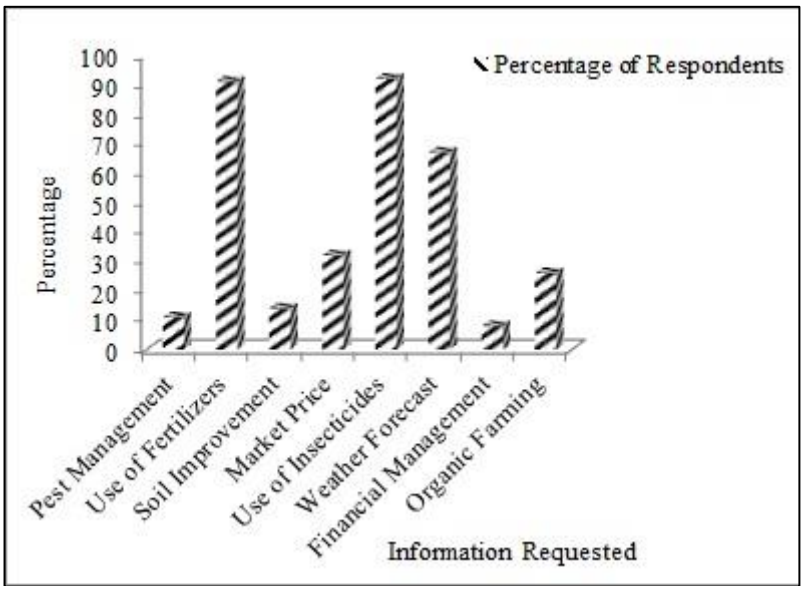

Fig.2 Information requested by Ratnagiri Farmers

The farmer's were found to be interested in receiving information on the use of fertilizers, insecticides, weather forecast, market price and organic farming using the preferred ICTs. In terms of frequency for getting information, majority of the farmers showed interest in getting weekly information followed by fortnightly. The preferred timing for receiving this information was evening compared to during the day. The study clearly indicates that there is a further need for strengthening the use of ICTs that will assist in accumulating the required timely information in a format that is simple, local, elicit and accurate. Such information may lead to the farming community increasing their efficiency and productivity and product distribution to market. Any improvements in productivity of such farming communities will only be beneficial to the Indian economy.

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