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Information and Communication Technology for Dissemination of Agricultural Information in Hills: A Critical Overview

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ABSTRACT

The farmers of the hill region are facing serious difficulties altogether with the lack of information dissemination channels. This is highly attributed to the geographical disadvantages of distantly located hamlets and fragmented household of hills. ICT has a significant role in bridging the gap of information dissemination in hills. In the present study an attempt has been made to delineate the role of ICT in dissemination of agricultural information among hill farmers in terms of sources of getting agriculture information, purposes of using ICT tools, networking with other stakeholders through ICT, usefulness of information received through ICT tools, and benefits and problems in using ICT tools in hills. The study was conducted in Mahatgaon cluster of Hawalbagh block in Almora district, Uttarakhand taking a random sample of 100 farmers. The data was collected by a pre-tested structured interview schedule through personal interview method. The study revealed that most of the respondents often received agriculture information from research and extension institutes working in the area like ICAR-VPKAS, KVK- Matela and GBPIHED (82%) followed by government and public departments (60%) and university like GBPUA&T (45%). It was reported that the main purposes of using ICT tools were for getting information about the weather (99%), farm advice (99%) and market (97%). Mobile was found to be the most used medium of networking with the stakeholders (up to 75%). Farmers perceived that farm advice and weather information received through ICT tools were most useful (80%). Easy access to information and lack of awareness were identified to be main benefit and problem of using ICT tools in hills, respectively.

Keywords: Agricultural information, hill farmers, ICT, information network

INTRODUCTION

The hill farmers are facing serious difficulties altogether with the lack of communication channels particularly information dissemination channels. In this era of information, access to the right information at the right time in the right format and from the right source has the ability to push a farmer towards success from failures (Opara, 2008). Lack of information dissemination in the hill is highly attributed to the geographical disadvantages of distantly located hamlets and fragmented households (Lahiri, 2016). The present era is the era of Information and Communication Technology (ICT). ICT has alone changed the structure of the society from have's and have not's to informed and not informed. The speed of change of a society largely depends on its accessibility and usability of different ICT tools. There are several ICT tools which are being used in modern day for the dissemination of information. These are radio, television, mobile phone, the internet etc. which are capable of spreading the information to masses as fast as possible with less involvement of manpower. The process of information dissemination through these ICT tools is very cost effective and time-saving. The advent of modern ICT tools has cut short the geographical distances of the people. The digitalization of the whole communication process from source to the receiver by using of ICT tools narrows down the physical barrier among the people throughout the world. The development agencies of all the nations are starting to understand the gravity of ICT in accelerating the development process by informing the masses about the development programs and technological progress which are happening in the world for the benefit of mankind. In India, the use of various ICT tools in the dissemination of information is gaining its speed day by day through various public and private initiatives. The success of some ICT interventions in India like e-Chaupal, Global Village, Village Kiosks, Wired Village etc. encourages the development workers to exploit the full potential of the ICT tools in stimulating the change process. ICT has a defined say in regions especially on the hill where information dissemination is

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a very hard task due to complex, diverse and risk-prone geographical terrain and scarcity of resources.

The farmers of the hill region are facing serious difficulties altogether with the lack of information dissemination channels. This is highly attributed to the geographical disadvantages of distantly located hamlets and fragmented households. It is mere impossible for the extension functionaries of the government departments to reach each farmer's doorsteps with the basket of information regularly particularly where the farmer : extension workers ratio (2879: 1) is wide (Mukherjee and Maity, 2015), bureaucratic and administrative workload and financial constraints has made the public extension services as supply driven rather than demand driven. Agriculture is the mainstay in hills. The majority of hill farmers are practicing low productive traditional farming despite the advent of various improved farming practices for hills. Furthermore, in 21st century like Indian agriculture hill agriculture too has been challenged by scarcity of irrigation water, menace of wild animal, shortage of labour (Mukherjee, 2015) growing inter-farm as well as inter-regional disparity, unequal household income and low productivity (Mukherjee *et al.* 2011, 2012) as a combined outcome of globalization and climate change. Agriculture is the mainstay in hills. The majority of hill farmers are practicing low productive traditional farming despite the advent of various improved farming practices for hills. The influence of Green Revolution is not very much prompt in hills due to this fact. It is not that the hill farmers are not receptive to the improved farm practices. The reason behind the non-adoption and partial adoption of modern farm practiced is mainly the lack of awareness of the hill farmers regarding those practices. The farmers have little information about the modern farm practices. Besides, the farmers are loosing their interest in farming due to low profit. It is also attributed to the lack of market information. As agriculture is highly dependent on weather and climate, so the modern phenomenon of climate change also gives the challenge to the survivability of the farming system. The forecasting of the unwanted weather events and at per contingency planning are the need of the hour to save the farmers from economic disaster. Hills are most susceptible to weather vagaries and farmers need to be informed in advance to take preventive measures. The expectation of speedy information relay is very high in hills but the situation is not very conducive for that purpose. In this insurmountable condition, the public and private agencies working in hills started using ICT tools to disseminate the useful information to their intended clientele. ICT has a significant role in bridging the gap of information dissemination in hills. The process of ICT interventions in hills is in very nascent phase but it is accelerating and new avenues are being opened day by day.

The ICT has three major roles to play- informative, instructive and influence. The instructive role of ICT is mainly used in administration whereas informative and influential roles of ICT were mainly exploited in development programs. The audience or receiver, in particular, the farmers, who are the ultimate users of the messages received from different sources through different ICT tools, perceive several roles of ICT which can satisfy their information needs and influence their behavior to a desirable way. Based on this context the present study was formulated to know the role of ICT in dissemination of agricultural information among hill farmers under the following objectives: (i) to study the sources of getting agriculture information in hills; (ii) to delineate the purposes of using ICT tools and networking with other stakeholders by farmers through ICT; (iii) to ascertain the usefulness of information received through ICT tools as perceived by the farmers; and (iv) to identify the benefits and obstacles in using ICT in hills as perceived by the farmers

METHODOLOGY

The study was carried out in Parkhola, Nogir, Chaukhola, Majhkhola and Nayee Basti villages of Mahatgaon cluster which is situated in Hawalbagh block of Almora district, Uttarakhand. The latitude, longitude, and altitude of Mahatgaon are 29º 38.956'N, 79 º 37.743'E and 1236m amsl, respectively. Among 500 farm families of the cluster, 100 farmers were randomly selected for the purpose of the study.

The data was collected by a pre-tested structured interview schedule through personal interview method. The frequency of getting agriculture information by the farmers was measured using a 3-point continuum *viz.* often (2), seldom (1) and never (0). The degree of the usefulness of information received through ICT tools as perceived by the farmers was also measured on a 3-point continuum *viz.* most useful (2), somewhat useful (1) and not useful (0). The list of items under segments like sources of getting agriculture information, purposes of using ICT tools and networking with other stakeholders through ICT was selected after the extensive review of related studies. Open-ended responses instead of closed-ended responses were invited from the farmers in case of identifying the benefits and problems in using ICT in hills. Descriptive statistics like frequency, percentage, and ranking were used to analyze the raw data.

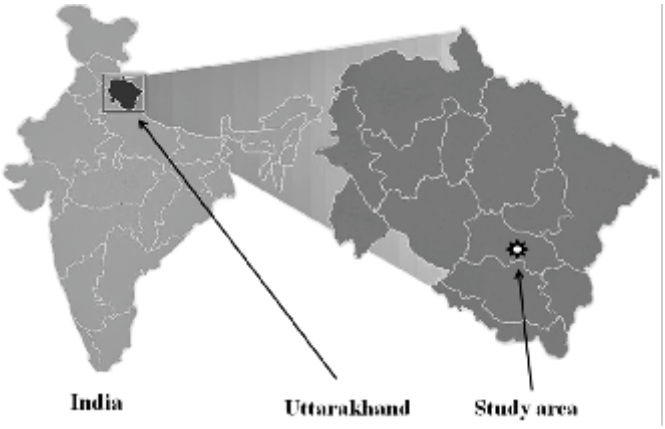

Fig1: Geographic Location of Study area

RESULTS AND DISCUSSION

Sources of getting agriculture information in hills

A scrutiny of Table 1 depicts that majority of the farmers often received agriculture information from research and extension institutes working in this area like ICAR-VPKAS, KVK- Matela and GBPIHED (82%) followed by government and public departments like state department of agriculture, horticulture, animal husbandry, fisheries, soil and water conservation, decentralized watershed management projects etc. (60%) and university like GBPUA&T (45%). ICAR-VPKAS, a premier institute of hill agriculture situated in Almora, through toll-free farmers' helpline service (1800-180-2311), Krishi Samriddhi and Kisan Vani radio programs and institute's website has been disseminating modern and innovative agriculture information to hill masses since a considerable time. The experts of KVK-Matela and GBPIHED are also disseminating the useful information by participating in radio programs. The websites of government and public departments are very much informative for the farmers regarding the awareness of new government programs and farmer-friendly activities. GBPUA&T, a pioneer agricultural university of the country serving the hill and terai farmers of Uttarakhand, has been using ICT for the dissemination of agriculture information through community radio system, agro-met advisory services etc. Besides the university designed a very information-enriched website which can satisfy the information needs of farmers and other stakeholders. It was also found that some farmers were in regular contact with the experts of these government and public institutes through the mobile phone for seeking their advice in farm related matters. The study revealed that private development agencies like NGOs, Voluntary organizations etc. were seldom approached by most of the farmers (61%) as a source of getting agriculture information. The private development agencies working in hills are not the original source of agricultural information like agricultural research institutes and universities rather they are acting as an intermediary for providing agriculture information to the farmers by collecting these from the original source. Private companies like seed company, fertilizer company, pesticide company, animal feed company etc. and financial institutes like a bank, insurance company etc. were identified to be the sources of agriculture information which are never used by the majority of the farmers (81% and 73%, respectively). Hill farmers are mainly practicing subsistence organic farming using very less amount of external inputs. So the private input companies have very little scope in hill agriculture. The financial institutes disseminate the information regarding crop loan, micro-finance, crop insurance etc. through their websites and these are very much useful for the farmers but farmers were found to prefer the personal contact with the financial institutes for the better understanding of their schemes rather serving the sites.

Table 1: Sources of getting agriculture information in hills n=100

Source	Frequency of getting information					
	Often (2)		Seldom (1)		Never (0)	
	F	%	F	%	F	%
Private company (Seed company, Fertilizer company, Pesticide company, Animal feed company *etc.*)	1	1.00	18	18.00	81	81.00
Private development agency (NGOs, Voluntary organizations *etc.*)	16	16.00	61	61.00	23	23.00
Government and public departments	60	60.00	16	16.00	24	24.00
University (GBPUA&T)	45	45.00	40	40.00	15	15.00
Research and extension institutes (ICAR-VPKAS, KVK- Matela and GBPIHED)	82	82.00	16	16.00	2	2.00
Financial institutes (Bank, Insurance company *etc.*)	4	4.00	23	23.00	73	73.00

Sharma *et al.* (2008) in their study on critical analysis of information sources and channels preferred by rapeseed-mustard farmers reported that scientist and agriculture officers were perceived as a much credible source of information by the farmers. Yadav *et al.* (2011) in their study on utilization pattern of different sources and channels of agriculture information used by the fenugreek growers revealed that agriculture supervisors were most utilized by farmers as the source of information.

Purposes of using ICT tools and medium of getting information

Table 2 shows the purposes of using ICT tools by the respondents and the media for getting information to meet these purposes. It was revealed that farmers used to utilize ICT tools for receiving information on market, farm

inputs (seeds, fertilizers, pesticides, animal feed *etc.*), improved farm practices, crop loan and insurance, post harvest and value addition, weather and extension programmes (farmers' fair, exhibition, training, demonstration *etc.*). The media which they used to get information on these subjects were mainly television (94-99%) followed by radio (85-97%). In television and radio, there are some agriculture-related programs like Krishi Darshan, Krishi Samriddhi, Kisan Vani etc. being broadcasted at regular intervals and these programs were reported to be very popular among the farmers as information sources. Telephone, mobile and the internet were found to be the least used media of the farmers for getting agriculture information (0-23%, 0-35% and 2-19%, respectively). It was found that these ICT tools were mostly used by the farmers for personal communication with friends and relatives.

Table 2: Purposes of using ICT tools and medium of getting information

n=100

Purpose	Radio (%)	TV (%)	Telephone (%)	Mobile (%)	Internet (%)
Market information	95.00	97.00	23.00	35.00	5.00
Input information (seeds, fertilizers, pesticides, animal feed *etc.*)	94.00	94.00	6.00	13.00	2.00
Farm advice	96.00	99.00	20.00	33.00	9.00
Crop loan and insurance service	92.00	94.00	0.00	14.00	7.00
Post harvest and value addition	85.00	95.00	0.00	0.00	9.00
Weather information	97.00	99.00	5.00	20.00	19.00
Extension programmes (Farmers' fair, Exhibition, Training, Demonstration *etc.*)	92.00	96.00	2.00	10.00	10.00

Chauhan (2010) in his case study on farmers' perception about ICT application in Gujarat state reported that the major purposes to have community internet center as explained by the respondents were to collect agricultural information, government's programs and market price. Butt et al. (2008) in their study on the role of mass media for enhancing potato production in district Okara of Pakistan found that radio was the most used mass media for dissemination of potato technology and it was utilized by 77.50 per cent of the farmers. Yadav et al. (2011) in their study on utilization pattern of different sources and channels of agriculture information used by the fenugreek growers revealed that television was the most utilized medium of getting information followed by radio and telephone/mobile.

Networking with other stakeholders through ICT

The new thinking is that for an extension to succeed, it must enhance its linkages and networks with research, farmers, and among extension providers (public and private). This way the capability of extension to transfer agricultural technology to farmers will be improved (Singh, 2011). It can be seen from Table 3 that majority of the farmers had their network with customers through mobile (70%) followed by telephone (58%). The same trend was also noticed in the case of networking with suppliers and transporters (63% and 50%, 65% and 50%, respectively). It was found that less number of farmers had networked with stakeholders like the private company (up to 5%), private development agency (up to 30%.) and financial institute (up to 33%). It was also observed that farmers maintained a good network with research and extension institutes, government and public departments and university through mobile (75%, 75% and 45%, respectively), telephone (60%, 60% and 33%, respectively), television (45%, 43% and 35%, respectively) and radio (40%, 30% and 27%, respectively). Mobile was found to be the most used medium of networking with the stakeholders (up to 75%) followed by telephone (up to 60%). Internet was identified to be the least used medium of networking with the stakeholders (up to 11%) followed by radio (up to 40%).

Table 3: Networking with other stakeholders through ICT

n=100

Stakeholder	Medium of networking				
	Radio (%)	TV (%)	Telephone (%)	Mobile (%)	Internet (%)
Customer	20.00	27.00	58.00	70.00	2.00
Supplier	5.00	12.00	50.00	63.00	5.00
Transporter	1.00	3.00	50.00	65.00	0.00
Private company (Seed company, Fertilizer company, Pesticide company, Animal feed company *etc.*)	2.00	3.00	5.00	4.00	0.00
Private development agency (NGOs, Voluntary organizations *etc.*)	3.00	15.00	19.00	30.00	5.00
Government and public departments	30.00	43.00	60.00	75.00	11.00
University	27.00	35.00	33.00	45.00	9.00
Research and extension institutes	40.00	45.00	60.00	75.00	9.00
Financial institute	15.00	20.00	14.00	33.00	5.00

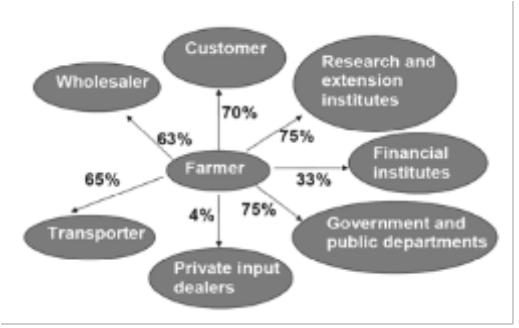

Fig 2. Use of mobile phone (%) for networking with different stakeholders by farmers

Usefulness of information received through ICT tools as perceived by the farmers

It can be observed from Table 4 that majority of the farmers perceived that farm advice and weather information received through ICT tools were most useful (80% each) followed by input information (70%) and information regarding extension programs (65%). Most of the farmers perceived that information regarding post-harvest and value addition, market information and crop loan and insurance service received through ICT tools were somewhat useful to them (65%, 64% and 63%, respectively). This information were found to be not useful to 20 per cent, 11 per cent and 17 per cent of the respondents, respectively.

Table 4: Usefulness of information received through ICT tools as perceived by the farmers

n=100

Item	Degree of usefulness					
	Most useful (2)		Somewhat useful (1)		Not useful (0)	
	F	%	F	%	F	%
Market information	30	30.00	64	64.00	11	11.00
Input information (seeds, fertilizers, pesticides, animal feed *etc*.)	70	70.00	23	23.00	7	7.00
Farm advice	80	80.00	10	10.00	10	10.00
Crop loan and insurance service	20	20.00	63	63.00	17	17.00
Post harvest and value addition	15	15.00	65	65.00	20	20.00
Weather information	80	80.00	15	15.00	5	5.00
Extension programmes (Farmers' fair, Exhibition, Training, Demonstration *etc*.)	65	65.00	30	30.00	5	5.00

Dhaka and Chayal (2010) in their study on farmers' experience with ICTs on transfer of technology in changing agri-rural environment reported that information on weather factors like rainfall, temperature and humidity and early warning systems about outbreaks of disease and pest infestation, and information about how to manage such outbreaks were considered most appropriate by majority of the respondents. Devi and Verma (2011) in their study on farm women preferences of communication sources for farm information reported that radio and television were useful mass media sources of information.

Benefits of using ICT tools as perceived by the farmers

The benefits of using ICT tools as perceived by the farmers were identified as per order of merit (Table 5) and these were easy access to information, timeliness in getting information, more coverage of subject matter, cost effective and help in making correct decisions. ICT reduces the physical barrier of distance and helps in communicating the message in less time and cost without the involvement of huge manpower. The messages are mostly multimedia messages covering more subject matter in a very lucid manner which attracts the every sense of the receivers. The timely information on weather and market helps the farmers to decide their activities accordingly to minimize the losses and harvest as much profit as possible.

Table 5: Benefits of using ICT tools as perceived by the farmers

n=100

Benefits of using ICT tools	Frequency	Rank
Easy access to information	100	I
Timeliness in getting information	94	II
More coverage of subject matter	87	III
Cost effective	83	IV
Helping in making correct decisions	78	V

The above findings of the study regarding the benefits of using ICT tools as perceived by the farmers were in conformity with the findings of Dhaka and Chayal (2010). The promise of ICTs in agricultural extension is that they can energize the collection, processing, and transmission of data, resulting in a faster extension of quality information to more farmers in a bottom-up and interactive channel of communication (Singh, 2011).

Problems in using ICT tools as perceived by the farmers

A perusal of Table 6 shows that majority of the farmers perceived that lack of awareness of using ICT tools was the main problem in using its services (95%) followed by lack of skill in using ICT tools (89%), language barrier in comprehending ICT directed messages (78%), lack of location-specific information (71%), high price of ICT tools (67%), insufficient ICT infrastructure (62%) and signal and tower problem (60%). ICT is not a new thing to the younger generation but it is a new thing to the older farmers who used to be habituated in traditional transfer of technology processes. They are not very much aware of using modern ICT tools. The proper use of ICT tools requires training which was found to be lacking on the farmer's part and this resulted in the lack of skill in using ICT tools. Sometimes ICT messages are sent in English and scientific languages which are hard to comprehend by the farmers. The messages which are spread by radio and television are sometimes very much general in nature which are not applicable to the local situation. Sometimes the poor farmer cannot afford to buy a good quality radio/television/mobile phone due to its high price. The common internet facility like village kiosks/ village cyber café is very rare to find at hill villages. There are a huge

signal and tower problem reported in villages which are geographically isolated. The problem in catching signal and tower makes the ICT tools like radio, television, and mobile inoperative in those villages.

Table 6: Problems in using ICT tools as perceived by the farmers

n=100

Problems	Frequency	Rank
Lack of awareness of using ICT tools	95	I
Lack of skill in using ICT tools	89	II
Language barrier	78	III
Lack of location specific information	71	IV
High price of ICT tools	67	V
Insufficient ICT infrastructure	62	VI
Signal and tower problem	60	VII

The above findings of the study regarding the problems of using ICT tools as perceived by the farmers were in line with the findings of Dhaka and Chayal (2010). Singh et al. (2008) in their study on the role of helpline services in technology dissemination revealed that poor connectivity, lack of awareness among farmers and incomprehensible technical information provided through helpline services were perceived as constraints in effective on-line information dissemination to the farmers. Chauhan (2010) in his case study on farmers' perception about ICT application in Gujarat state also reported that the information on farmers' related sites was expected by most of the farmers in local (Gujarati) language.

CONCLUSION

ICT intervention in hills is the need of the hour. It not only bridges the gap of the distantly located villages through the web but also accelerates the development process in hills. Agriculture is the main occupation in hills and it is eroding day by day from the mindset of younger generation due to its less remunerative nature. This is attributed to the low productivity of traditional farming practices prevalent in the hills. The farming community in hills is not well aware of the recent advances in the agriculture. This lack of awareness is the resultant of the poor information network in hills which is unable to satisfy the information needs of the farmers in the context of climate change and globalization, privatization and liberalization of the markets. The public departments are trying their level best to inform the farmers regarding the improved farm practices but their efforts are limited by the difficult hill terrains and lack of needed manpower. The effective use of ICT tools can supplement their efforts in a better way. But it needs proper infrastructure at village level and capacity building of the extension agents and farmers for using modern ICT tools. The harmony of traditional transfer of technology processes with the modern ICT-led modern transfer of technology processes makes the whole extension process fine tuned and effectively capable of handling any challenge. The present study depicts the role of ICT in the dissemination of agriculture information among hill farmers based on the perception of the respondent farmers. It covers the areas like extent of usage of ICT tools by the farmers, sources of getting agriculture information in hills, purposes of using ICT tools and medium of getting information, networking with other stakeholders through ICT, usefulness of information received through ICT tools, role of ICT in providing information on climate change issues, benefits of using ICT tools and problems of using ICT tools in hills. The major findings of the study were as follows-(i) the main source of getting agriculture information in hills is the research and extension institutes working in the area, (iii) the main purposes of using ICT tools are for getting weather information, farm advices and market information, (iv) mobile is the major tool for networking with the other stakeholders of agriculture, (v) easy access to information is the main benefit of using ICT tools and (vi) lack of awareness is the main problem of using ICT tools. The major recommendation of the study is that the hill farmers should be sensitized about the different avenues of ICT in order to grasp its full potential for dissemination and receiving of agriculture information in proper time and place. The study has a future scope of being replicated in hilly areas with a different sample and additional segments of ICT.

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