The Power of Information: Impact of Knowledge Sharing Agri Portals in Rural India

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Abstract

In agriculture and rural development, a variety of fairly large-scale and mature ICT-enabled projects are providing social and economic value all along the agro-value chain by filling the information gap for the farmers. Such projects, directly linked to income-generating activities, have visible direct economic value for end-users. The large projects have impact on up to several million rural dwellers, while benefiting all actors of rural development. However, the impact assessment of these projects is still an open issue in terms of methodology and results, which leads to failure of many such ICT initiatives especially in agriculture. The present study is an effort towards assessing two such ICT initiatives in agriculture launched by the Government of India.

Introduction

It has been argued that Information and Communication Technologies (ICT) can lead to development in developing countries. The World Bank, United Nations (UN) and other donor agencies are directly or indirectly implementing ambitious multi-million dollar Information and Communication Technology (ICT) - supported agricultural projects in developing countries. These projects aim to unlock the potential of ICT to improve the quality of life for poor, often rural farming communities. Harris (2005) and Heeks and Molla (2009) find in their ICT evaluation compendium that ICT is not fully utilized in agriculture. Scaling up of delivery, monitoring and evaluation still remain at an experimental stage. There is much hope for sustainable impact, arising from development-oriented ICT interventions, especially in the field of agriculture in remote hilly areas (Mbarika, Okoli, Byrd & Datta 2005; Meso, Datta & Mbarika 2006). In the past, emphasis has been placed on the supply side (for example, infrastructure building) rather than the demand side (for example, farmers' willingness and capacity to acquire/use services) (Ashraf, Hanisch & Swatman 2007; Heeks 2002). Hence, the main focus of the interventions has been

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on the implementation of ICT for agricultural development (ICT4AD) projects, rather than on understanding the impact at farming community level. This lack of understanding has led to many failures of ICT4AD (Information and Communication Technology for Agricultural Development) projects reported in the literature (Heeks, 2002). With little understanding of their ultimate consequences, we consider that there is need to understand the impact of ICT4AD projects at the local context, which can then be informed at the policy and strategic levels. However, the methodologies used to evaluate the impact of ICT on stakeholders' communities are still an open issue.

In Uttarakhand, a hilly state in northern India, in spite of rapid progress in many sectors owing to high literacy rate,, farmers are facing many hardships because of the lack of basic amenities, almost no connectivity with the outside world, and tough physical reach. Despite the huge potential to harness ICT for agricultural development, only a few isolated projects have been tried in Uttarakhand like e-chaupal, Rural Knowledge centers, Agricultural Technology Information Center (ATIC), *Janadhar Soochna Kutir* (JSK), and Village Resource Center (VKCs) etc. Adding to this series, two Agri-portals viz. agropedia and aAQUA were launched at the national level and also widely implemented in Uttarakhand state. These portals were specifically designed and developed to transmit the latest crop, location and language specific information to the Indian farmers in general and farmers of Uttarakhand in particular. Barala and Rathore (2006) reported that most of the farmers felt that Rural Knowledge Centers (RKCs) were highly reliable because the *sanchalak* (operator) belonged to their own village where as the extension agent was not personally known to them. RKCs were more easily accessible than extension agents because centers were established in the same village. Majority of the respondents expressed greater credibility in RKCs than traditional extension agencies because of the negative perception about the public sector services and lack of trust in them. They also reported that farmers found it difficult to understand the information provided due to the scientific language used.

Richardson and Sirimanne (2001) revealed that the benefits of expanding ICT to major urban cities have been well documented. However their impact on the rural stakeholder community is not analyzed. Unfortunately, very few attempts to evaluate ICT projects have been found in the hill context, coupled with the fact that evaluation of ICT on farming communities is still an open issue in terms of the methodologies and impact.

Agri-portals have been launched to provide agricultural information to the farmers in the local language for the first time. Thus, problems and prospects of Agri-

portals need to be explored in Uttarakhand to identify their impact on farmers and for further recommendations.

Objectives of the study

Since, ICT for agricultural development is new in India in general and in Uttarakhand in particular, any attempt to evaluate only the end results would be premature and it is too early to expect concrete and sound results from the projects. Hence, the present study is planned to measure the process impact of the selected Agri-portals rather than the end result impact. Keeping all these in mind, a study was planned with the following objectives:

1. To study the socio-economic and communication characteristics of selected farmers of Uttarakhand.
2. To study the impact of selected Agri-portals among the selected farmers of Uttarakhand.

Methodology

The methodology used was designed to be a judicious mix of qualitative and quantitative techniques. It was felt that this mix would enable cross verification of information at various stages.

Sampling

Four trainings along with the follow-up trainings on aAQUA and Agropedia have been conducted by Directorate of Extension Education, GBPUAT, Pantnagar (State Agricultural University) along with Indian Institute of Technology, Bombay and Indian Institute of Technology, Kanpur (the premier Technological institutes in India). A total of 90 progressive farmers from three districts of Uttarakhand (Dehradoon, Udham Singh Nagar and Nainital) were identified by the respective Farm Science Centers (Government of India has established one Farm Science Center in each district of the country, where scientists from Agriculture and Allied sectors have been appointed to work with farmers at the grass roots) to attend the trainings on Agropedia and aAQUA. So, all the farmer trainees were selected through census method for the present study. Out of 90 farmers, 83 responded to the investigation.

Framework for Impact Assessment

For measuring the impact of selected Agri-portals, several evaluation and impact assessment models were reviewed viz. Daniel Stufflebeam's CIPP Model (Context, Input, Process, Product), CIRO (Context, Input, Reaction, Outcome), Scriven's Goal-Free Evaluation Approach, Suchman's Logic Approach Model, Heeks' (2005)

Information Chain Model, an Extended Framework for Investigating ICT Impact Towards Development, Social Impact Assessment (Vanclay, 2003), Measuring Impact model (NCVO, 2003), Program Action Logic model, Participatory Impact Pathways Analysis (PIPA, 2006), TOP model (1995) and Bennett Hierarchy Seven Step Model of Planning and Evaluation.

Of these, seven levels Bennett Hierarchy Model of Planning and Evaluation (1976) was found suitable and was adapted with some modifications for the present impact assessment study. The seven levels of Bennett Hierarchy Model of Planning and Evaluation identified were: I - Input, II - Activities, III - Output, IV - Reactions, V- Knowledge and Attitude change, VI - Practice change, and VII - Gratification of the services.

Tools for Data Collection

In order to study the extent of awareness of Agri-portals, inputs used, activities of key stakeholders, outputs of selected Agri-portals, knowledge and extent of adoption of the advice, opinion of stakeholders, practice change, information sharing behavior of farmers, gratification of the services of Agri-portals and immediacy of feedback by Agri-portals, an impact assessment index was made. On the basis of pilot testing and expert validity, the items for final impact assessment index were selected. The reliability coefficient was 0.81, calculated through Split half method. Data collection was done with the help of an interview schedule, impact assessment index and opinionnaire from May, 2011 to July, 2011. All the farmer respondents were personally interviewed by the researcher in the study area. Analysis and interpretation of data was done by using Statistical Package for Social Sciences (SPSS) with the help of mean, standard deviation, frequency, percentage, and coefficient of variation.

The data in Table 1 reveals the personal and communication characteristics of the progressive farmers of the selected locale. Majority of the farmer respondents (55.42 per cent) was found to be in the middle age category (20-48 years). Almost all farmer respondents in all three districts were literate. Majority of the farmers (49.39 per cent) were educated up to intermediate level. Majority (56.62 per cent) of the farmers' main occupation was agriculture. Nearly half (48.19 per cent) of the farmer respondents belonged to general caste followed by other backward caste (28.91 per cent) and Scheduled Caste/Scheduled Tribes (22.89 per cent). Three fourth of farmers had 'medium' family income followed by nearly one fourth i.e. 22.98 per cent farmers with 'low' family income and only 13.25 per cent with 'high' family income.

Results and Discussion

Table 1. Profile of the Farmers n=83

S.No.	Socio-Economic, Communication and Farming Characteristics	Percentage (Majority of Population)
1.	Age	55.42 (belonged to middle age group)
2.	Education	49.39 (educated up to Intermediate)
3.	Occupation	56.62 (Agriculture)
4.	Caste	48.19 (Upper caste)
5.	Annual income	63.85 (had medium annual income)
6.	Marital status	57.83 (were married)
7.	Gender	87.95 (Male)
8.	Family type	89.15 (Nuclear)
9.	Family size	81.92 (had medium family size)
10.	Access point	50.60 (was Farm Science Center)
11.	Communication media possession	68.67 (medium communication media possession)
12.	Agricultural equipment possession	53.01 (high agricultural equipment possession)
13.	Social participation	44.57 (had medium level of social participation)
14.	Reach of extension agency	67.46 (agricultural department)
15.	Interpersonal sources of communication	96.38 (from fellow farmers)
16.	Access to modern technology	95.18 (television)
17.	Farming experience	63.85 (less than 10 years of experience)
18.	Land holding	36.14 (were large farmers)
19.	Livestock possession	53.01 (possess 1-7 animals)
20.	Crop wise cultivated area	50.60 (grow 2-3 crops)

Majority (57.83 per cent) of the progressive farmers were married followed by (39.75 per cent) unmarried. Majority (87.95) of farmer respondents were males followed by farm women (12.04 per cent). Majority of the respondents (89.15 per cent) belonged to nuclear family followed by joint family (10.84 per cent). Vast majority (81.92 per cent) of farmers and farm women had medium size family followed by large family (12.04 per cent) and small size family (6.02 per cent). Most of the farming community (50.60 per cent) goes to Farm Science Centers for access to the selected Agri-portals followed by 26.50 per cent farmers, who accessed information online at their home and cyber café (19.27 per cent). Majority (68.67 per cent) of the farmers belonged to 'medium' level of communication media possession followed by high

communication media possession (22.89 per cent). Majority (53.01 per cent) of farmers possessed 'high' level of agricultural equipment followed by 36.14 per cent of those who had 'low' level of agricultural equipment. Maximum farmers (44.57 per cent) had a medium level of social participation followed by high (39.75 per cent) and (15.66 per cent) low social participation. All (100 per cent) the farmers contacted Farm Science Centers for getting information about selected Agri-portals. Among extension agencies, 67.46 per cent contact the Agricultural department while 62.65 per cent contact the Animal Husbandry department.

Majority (96.38 per cent) of respondents contact fellow farmers to get agricultural information. This was followed by friends who 90.36 per cent farmers contact for information followed by family members or relatives (83.13 per cent), neighbors (68.67 per cent) and progressive farmers (59.03 per cent). Television (95.18 per cent) followed by KVKs (93.97 per cent), farmer's fair (87.95 per cent) and trainings (78.31 per cent) were the next most popularly accessed media. Internet was used by almost half (49.39 per cent) of the farmers to get agricultural information followed by newspapers (42.16 per cent).

Majority of the farmers had low (63.85 per cent) farming experiences followed by medium (20.48 per cent) and high (15.66 per cent) farming experiences. Maximum (36.14 per cent) number of respondents were large farmers followed by medium (34.14 per cent) and small (28.91 per cent) farmers respectively. Majority (53.01 per cent) of the farmers had medium animals possession followed by 36.14 per cent of those who had low and high animal possession (9.00 per cent). Majority (50.60 per cent) of farmers grow 2-3 crops on yearly basis followed by 42.16 per cent farmers who grow less than 2 crops and only 7.22 per cent farmers grow more than 3 crops in a season.

Impact of selected Agri-portals in Uttarakhand

Table 2 reveals that all the farmers (100 per cent) were aware about the existence of selected Agri-portals viz agropedia and aAQUA since 2 years. This was through Farm Science Center scientists (97.59 per cent) followed by scientists of State Agriculture University (46.98 per cent) in case of agropedia; majority (95.18 per cent) of the farmers got aware about aAQUA through Farm Science Center scientists.

Majority of the farmers (97.59 per cent) visited the aAQUA portal followed by almost half of the farmer respondents (50.60 per cent) who visited the agropedia portal. Majority (96.38 per cent) of them visited agropedia to get agricultural information followed by getting latest market information (6.02 per cent). In case of

Table 2: General information about impact of selected Agri-portals

S. No.	Variable	aAQUA	agropedia
1.	Extent of awareness		
	a. aware	100 per cent	100 per cent
2.	Time of awareness		
	a. More than two years	100 per cent	100 per cent
3.	Sources of awareness		
	a. Farm Science Center, scientists	95.18 per cent	97.59 per cent
4.	Visits to Agri-portals		
	a. Visited	97.59 per cent	50.60 per cent
5.	Purpose of visit		
	a. Agricultural practices	86.74 per cent	96.38 per cent
6.	Frequency of visit		
	a. Need based	78.31 per cent	75.90 per cent
7.	Information sharing behavior		
	a. Shared	85.54 per cent	81.92 per cent
8.	Number of persons shared		
	a. More than 10	43.37 per cent	43.37 per cent
9.	Nature of persons shared		
	a. Neighbors	74.69 per cent	74.69 per cent
10.	Gratification of the services		
	a. Satisfied	77.10 per cent	60.24 per cent
11.	Immediacy of feedback		
	a. More than a week	26.50 per cent	43.37 per cent
12.	Utilization of knowledge gained		
	a. Utilized to medium extent	68.62 per cent	46.98 per cent
13.	Knowledge level		
	a. Medium knowledge	68.67 per cent	68.67 per cent

aAQUA, 86.74 per cent farmers visited for agricultural practices and the rest 22.89 per cent were interested in getting market updates. Majority (75.90 per cent) of farmers visited agropedia and 78.31 per cent farmers visited aAQUA according to their needs. Regarding frequency of visit, 9.63 per cent farmers visited both the Agri-portals monthly followed by weekly (4.81 per cent in both the cases) and a similar number of farmers (4.81 per cent for both the Agri-portals) visited daily.

Majority (81.92 per cent) and (85.54 per cent) of farmers shared the information provided through agropedia and aAQUA respectively, with more than 10 persons (43.37 per cent). Among them majority (74.69 per cent for both) was neighbors followed by relatives (66.26 per cent each), 60.24 per cent farmers shared the information with their family members followed by 57.83 per cent who shared with friends and 32.31 per cent who shared this information with fellow farmers. Majority (60.24 per cent and 77.10 per cent in case of agropedia and aAQUA respectively) of the farmers were satisfied with the recommendations of selected Agri-portals.

In response to the queries of registered farmers of agropedia, most (26.50 per cent) of them received a reply in more than one week followed by 13.25 per cent farmers who got the solution to their problems within a week. Maximum (43.37 per cent) number of farmers got the reply from aAQUA in more than one week followed by 30.12 per cent who got the answers within a week.

Maximum number (46.98 per cent) of farmers utilized the agricultural knowledge gained through the agropedia to a medium extent followed by 36.14 per cent farmers who have not utilized the knowledge gained and very few farmers (3.61 per cent) utilized it to the fullest extent. In case of aAQUA majority (68.62 per cent) of the farmers utilized the knowledge gained to a medium extent followed by 16.86 per cent farmers who have not utilized and 10.80 per cent, who utilized it to the fullest extent. Majority (68.67 per cent) of the farmers gained medium knowledge (scored between 5 to 11 out of 17) followed by 15.66 per cent high knowledge (scored more than 11 out of 17) and 15.66 per cent low knowledge (scored less than 5 out of 17) after exposure to the selected Agri-portals.

Data presented in Table 3 shows that practices recommended by agropedia have some impact on those farmers who began practicing the recommendations after exposure to agropedia and on those who have the intention to adopt these in future. Most of the farmers reported that they started following practices regarding land preparation (20.48 per cent), seeds/varieties (28.91 per cent), seed treatment (36.14 per cent), sowing methods (28.91 per cent), spacing (24.09 per cent), weeding (27.71 per cent), and plant protection (24.09 per cent) after being exposed to agropedia. On the other hand, most of them intended to practice these in the near future. Very few farmers reported that they had no plans to adopt the recommendations of agropedia. It can be concluded that despite the fact that the Agri-portal is very new of its kind, still farmers appreciated and adopted its advisory.

A perusal of Table 3 also reveals similar results with reference to aAQUA. Farmers reported that they started following practices related to land preparation (21.68 per cent), seeds and varieties (28.91 per cent), seed treatment (36.14 per cent), sowing time (20.48 per cent), sowing methods (28.91 per cent), spacing and weeding (24.09 per cent and 27.71 per cent respectively) and plant protection (24.09 per cent). Most of the farmers intend to practice these in the future. Again very few farmers reported that they do not have any plans to adopt these practices even in future.

Table 3: Extent of adoption of practices recommended by selected Agri-portals

S. No.	Practices recommended	Practicing prior to exposure of agropedia		Began practicing after exposure to agropedia		Intend to practice in the future		No plans to adopt	
		agropedia	aAQUA	agropedia	aAQUA	agropedia	aAQUA	agropedia	aAQUA
1.	Land preparation	60.24	60.24	20.48	21.68	9.63	9.63	3.61	3.61
2.	Seeds/varieties	28.91	28.91	28.91	28.91	27.71	27.71	12.04	12.04
3.	Seed treatment	26.5	26.5	36.14	36.14	30.12	30.12	4.81	4.81
4.	Sowing time	59.03	59.03	19.27	20.48	8.43	8.43	7.22	7.22
5.	Sowing methods	19.27	19.27	28.91	28.91	39.75	39.75	8.43	8.43
6.	Spacing	33.73	33.73	24.09	24.09	32.53	32.53	7.22	7.22
7.	Weeding	2.40	2.40	27.71	27.71	56.62	37.34	6.02	6.02
8.	Plant protection	2.40	2.40	24.09	24.09	34.93	34.93	7.22	7.22
9.	Critical stages of irrigation	48.19	48.19	9.63	9.63	25.3	25.3	4.81	4.81
10.	Harvesting	100	100	0	0	39.75	39.75	4.81	4.81
11.	Storage	13.25	13.25	15.66	15.66	50.60	50.60	4.81	4.81
12.	Marketing	13.25	13.25	4.81	4.81	91.56	91.56	0	0

Table 4: Extent of Economic Change among the users of selected Agri-portals (n=83)

S. No.	Aspects	agropedia	aAQUA
		Percentage	Percentage
I.	**Increase in yield**		
1.	No change	50.62	45.78
2.	Up to some extent	45.78	50.62
3.	Up to large extent	0	3.61
II.	**Change in quality of produce**		
1.	No change	50.62	20.48
2.	Some change	44.58	75.90
3.	Significant change	1.12	3.61
III.	**Income level**		
1.	No change	75.90	42.17
2.	Up to some extent	22.89	51.81
3.	Up to large extent	00	6.02
IV.	**Number of crops grown on fields every year**		
1.	No change	83.13	62.65
2.	Up to some extent	13.25	24.09
3.	Up to large extent	2.41	13.25
V.	**Diversification of crops**		
1.	No change	85.54	62.65
2.	Shifted from traditional crops to cash crops	13.25	36.14
3.	Shifted from traditional varieties to hybrid varieties	00	1.12
VI.	**Disease control**		
1.	No change	56.62	25.30
2.	Up to some extent	32.53	40.96
3.	Up to large extent	7.23	32.53

The economic changes due to adoption of practices recommended by agropedia and aAQUA were studied for six components. It is clear from Table 4 that practices recommended by selected Agri-portals attempted to bring positive changes among the farming community like increase in yield, changes in the quality of produce, income level, number of crops grown every year, diversification of crops, disease control etc. However, most of the changes tilted towards the negative side; half (50.62 per cent) of the farmers reported that there was no change in increase in yield. This might be because these Agri-portals are not very old yet to show impact on yield and income level. A fair percentage (45.78 per cent) of farmers said that somewhat positive changes occurred due to adoption of the practices recommended by agropedia.

Again half (50.62 per cent) of the farmers expressed that there was no change in the quality of their farm produce followed by 44.58 per cent farmers who reported some changes in produce. Only a negligible (1.12 per cent) number of farmers reported significant changes in farm produce. Regarding income level, 75.90 per cent farmers reported no change in income level while 22.89 per cent reported income status changes to some extent. The large majority (85.54 per cent) of farmers did not shift towards the diversified cropping pattern and still stuck to the traditional system of cultivation. This was followed by 13.25 per cent farmers who changed to some extent and adopted the recommended diversified cropping system. Regarding number of crops grown, 83.13 per cent farmers did not change the total number of crops grown in their fields every year followed by only few farmers (13.25 per cent) who changed to some extent while a negligible (2.41 per cent) number of farmers changed to a large extent. Majority (56.62 per cent) of farmers experienced no change in disease control followed by a few farmers (32.53 per cent) who experienced some changes and relatively less farmers (7.23 per cent) who experienced significant changes in disease control. The reason might be that farmers could not access the information on a daily basis, which is quite difficult for rural farmers. Lack of time, infrastructure, and computer illiteracy might be the hindering factors for farmers.

Changes in yield, changes in the quality of produce, economic changes, number of crops grown every year, diversification of crops and disease control due to aAQUA are presented in Table 4. It is clear from the table that majority of farmers reported that yield increased to some extent due to the adoption of practices recommended by aAQUA. No change in yield increase was reported by 45.78 per cent followed by very few farmers who experienced yield increment to a large extent. A large majority (75.90 per cent) of farmers experienced that quality of produce improved due to the adoption of recommended practices from aAQUA. In contrast, 20.48 per cent farmers reported no changes due to the recommendations of aAQUA. This may be because the recommendations were not crop and language specific for the hilly farmers. A significant change in the quality of produce was reported by a very few (3.61 per cent) farmers.

The economic change due to adoption of practices recommended shows that majority (51.81 per cent) of the farmers experienced an increase in income level to some extent followed by 42.17 per cent of farmers who reported no changes in income level. Few farmers (6.02 per cent) reported significant changes in income level. This might be because some of the farmers were very progressive and had computer and internet facilities at their homes so they did not need to go or contact

elsewhere for the information. The information was available at their doorstep and they got the latest information at the right time.

Regarding the number of crops grown every year on field, majority (62.65 per cent) of farmers reported no changes. They are still carrying out the same practice followed over the years. The investigation also revealed that as much as 24.09 per cent farmers reported an increase in the number of crops grown in the field every year to some extent, followed by 13.25 per cent farmers who reported significant changes in cropping pattern. This indicates that practices recommended were effective to some extent but still need to be farmer friendly and location and language specific for the information to be adopted by a number of farmers.

The majority of the farmers did not shift from traditional crops to cash crops and were still following the same cropping pattern. Positive changes in crop diversification were reported by as many as 36.14 per cent farmers. Again very few farmers (1.12 per cent) shifted from traditional crops to hybrid varieties. Thus, it can be concluded that it is very difficult for the rural farming communities to leave their indigenous practices and easily adopt the latest practices, even if they are relatively advantageous over their existing ones.

Regarding disease control advice from aAQUA, fairly good results can be seen. A maximum number of farmers reported that they succeeded in controlling the major crop diseases to some extent. It is significant to note that as much as 32.53 per cent farmers controlled crop disease to a large extent, which is a positive change due to the recommendations of aAQUA.

Thus, it can be concluded that on an average, economic changes were satisfactory to some extent, but still a large majority of farmers did not experience the same. The possible reason could be that any information generally takes some time to penetrate into the society and takes some time to be adopted. Since, the selected Agri-portals were not mature enough in this area, many changes could not be expected. While we look for some positive changes it can be suggested that necessary steps might be taken to provide quality advice to the farmers for better adoption.

Conclusion

Results shows that recommendations from selected Agri-portals viz agropedia and aAQUA had helped the farmers to gain and enrich their knowledge regarding the latest agricultural practices. Farmers can sell their produce at best prices without giving commissions to the middlemen, thus, reducing the role of intermediaries in the scenario. On the basis of the findings, it can be recommended that Farm Science

Centers should be equipped with more number of computers and internet facility as it was found to be one of the most preferred access points for the farmers. More training can be conducted for the progressive as well as small and marginal farmers to popularize the use of web portals among the farmers. It is also recommended that State Agriculture University scientists and portal managers may conduct benchmark surveys and need assessment before issuing Agro-advisories to the farmers so that need based advisories can be issued for better outcomes.

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