

Scientists' Perception Towards Role of Information and Communication Technologies in Agricultural Extension

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Received: 28 July 2014/Revised: 3 February 2015/Accepted: 26 August 2015/Published online: 22 December 2015
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Abstract Investigation measures the perception of agricultural scientists' towards application of Information and Communication Technologies (ICTs) in agricultural extension. Data were solicited from 87 agricultural scientists from proportionately selected 29 Krishi Vigyan Kendras across Rajasthan and Gujarat state. Collection of data was performed during 2012–2013 using Likert-type scale on 5-point continuum. Multiple linear regression model applied for measuring effect of personal variables on perception level of scientists. Scientists expressed their positive perception in using ICTs tools for agricultural extension. Higher education level and trainings on ICTs had positive and significant influence on perception, while scientists' age and working experience had negative influence.

Keywords Krishi Vigyan Kendra · ICTs · Perception · Scientists · Agricultural extension

The Indian Council of Agricultural Research (ICAR) has a well established Krishi Vigyan Kendras (KVKs) system which acts as knowledge and resource centre for farmers at district level. The situation assessment survey of farmers conducted during the 59th round of the National Sample

Survey [1] provided valuable insights into reach of extension services across India. The public sector extension worker was a source of information for only 5.7 % of farmer households interviewed and KVK accounted as an extension source for only 0.7 % of sample farmers. Survey showed that 60 % of farm households did not access any information on modern technology. The extension staff and financial constraints make the agricultural extension more difficult. Study reveals that extension through personal contact is difficult as ratio of staffs to farmers varies widely from 1:300 in Kerala to 1:2000 in Rajasthan [2]. Hence, agricultural extension have opened the door to examine how ICTs can be effectively and practically employed to facilitate information delivery and knowledge sharing among farmers, extension agents and other stakeholders [3]. ICTs can act as a catalyst to enable better adoption of improved technologies, crop varieties and farming practices [4]. Besides transfer of agricultural technologies through ICT, more services such as training, distance education, extension management, communication, administration, health and knowledge sharing may be encouraged [5]. ICTs are promoting convergence in agricultural extension which find a common platform for research, extension, production and marketing systems for sharing and re-use of knowledge. Keeping these facts in view, a study was undertaken to measure the perception of KVK scientists towards application of ICTs in dissemination of agricultural technologies and to suggest the ways for efficient utilization of ICTs.

The study was carried out at ICAR-Zonal Project Directorate, Zone-VI, Jodhpur during 2012–2013. The proportionate random sampling technique was employed in selection of KVKs. Out of total 57 KVKs, 29 KVKs (i.e., 16 from Rajasthan and 13 from Gujarat) were selected. From each KVK, 3 agricultural scientists were interviewed

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for data generation. Hence, a total of 87 scientists constituted total study sample. Data were obtained on personal variables and perception towards application of ICTs with the help of structured schedule. Perceptions of scientists were measured using Likert-type scale. The scale had 5-point continuum namely 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral or Undecided, 4 = Agree, and 5 = Strongly Agree for positive statement and reverse system of scoring for negative statements. Multiple linear regression model used for measuring the effect of selected personal variables on perception of scientists. The independent variables were selected based on the literature review. The following functional form has been used:

$$Y_i = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + U_i \text{ (for } i = 1 \text{ to } n \text{ number of respondents)}$$

where, Y_i is the Perception of i th respondent, X_{1i} is Age (in years) of i th respondents, X_{2i} is working experience (in years) of i th respondent, X_{3i} is dummy variable for designation of i th respondent (0 = Programme coordinator & 1 = Subject Matter Specialist), X_{4i} is dummy variable for education of i th respondent (0 = PhD & 1 = MSc), X_{5i} is dummy variable for training of i th respondent (0 = No training acquired related to ICT & 1 = Training acquired related to ICT), α is intercept, β_1 to β_5 are the partial regression coefficients.

Considering the problem of multicollinearity (significant correlation between independent variables included in regression model), stepwise regression has been used to identify the relevant independent variables that influence the perception of respondents.

The study of personal variables reveals that 52.87 % scientists belonged to middle age category i.e., 35–50 years. While, 26.44 % belonged to young age group (below 35 years). Nearly one-fifth scientists (20.69 %) aged above 50 years. Majority of them (67.82 %) had completed Doctorate of Philosophy (Ph.D) degree followed by Post Graduation (32.18 %). Mostly respondents (74.71 %) belonged to cadre of Subject Matter Specialist (SMS) followed by Programme Coordinator (PC) (25.29 %). Scientists had (60.92 %) wide range of professional experiences, i.e., 3–16 years, while one-fifth (20.69 %) had more than 16 years of service. Nearly one-fifth, (18.39 %) had less than 3 years of working experience in KVK system. It was observed that hardly one-third (33.33 %) scientists had attained the trainings in ICTs. Perception responses of scientists were categorized in rank order on the basis of mean and standard deviation (Table 1). Scientists of KVKs strongly agreed that ICTs promote communication and coordination among KVKs, research institutes and State Agricultural Universities (SAUs). Internet is an important source for collecting current information on production technology, processing,

value addition, marketing and other aspects of agriculture. These two statements ranked as first important application of ICTs. ICTs are helpful in KVKs to carry out the extension activities like training, demonstration, field day, farmers' fair, campaign etc., which was perceived as second important application. ICTs help to strengthen the research-extension-farmer linkage and videos are very useful for educating farmers on improved practices and technologies. The statement was ranked as third important application. Respondents perceived that mobile phone is the emerging ICT tool for extension work in India in the fourth rank. Other five statements in their order of importance indicate usefulness of ICTs in dissemination of information to farmers as well as analysis of research data. Respondents perceived that KVK functionaries are overburdened. Hence, Management Information System (MIS) can help in reducing heavy workload and enhance scientific productivity as tenth rank. With respect to negative statements, respondents rated them in lower ranks and most of them disagreed with these statements. Based on overall perception of respondents, it could be inferred that ICTs are important in process of dissemination of technologies to farmers/farm women while working in KVKs. Results of step-wise regression presented in equation. The figures in parenthesis show the standard error.

$$Y_i = 105.38(3.41) - 0.59X_1(1.33) - 4.56X_4(0.78) + 12.80X_5(1.39)$$

Stepwise regression indicates that 62 % variation (R^2) in perception of scientists has been accounted by independent variables included in the model. The training acquired by scientists on ICTs had positive and significant relationship with perception. On an average, *ceteris paribus*, perception score increased by 12.80 when respondents were imparted training on ICTs [6, 7]. As expected, the partial regression coefficient for age indicated a negative relationship with perception. If the age of the respondent goes up by one year, then the perception score reduces by 0.59. Aged scientists had more working experience but accustomed with old technology [8]. On other side, young scientists were more enthusiastic towards new technology. Analysis indicated that perception score with education (i.e., M.Sc) is less by 4.56 in comparison to Ph.D. The feedbacks of respondents were also documented for effective utilization of ICTs. The scientists (91.95 %) expressed their desire to develop village level KIOSK for information. While, 88.51 % advocated for training on ICTs in agriculture and also expressed the need to have MIS to reduce paper work and reporting burden in KVKs (83.91 %). Mostly scientists (82.76 %) advocated for sending the voice messages on mobile to illiterate farmers and providing ICT facilities at individual farmers' level (79.31 %). Scientists needed an alternate power source of electricity (74.71 %) at KVK level.

Table 1 Scientists' perception towards application of ICTs in agricultural extension (Source: Primary data)

Sl. no	Statements	Mean	Standard deviation	Rank
1.	ICTs promote communication and coordination among KVKs, research institutes and SAUs	4.60	0.56	1
2.	Internet is an important source for collecting the current information on every aspects of agriculture	4.60	0.56	1
3.	ICTs are helpful in carrying out extension activities like training, demonstration, field day, kisan mela, campaign etc	4.51	0.63	2
4.	ICTs help in strengthening research-extension-farmers linkage	4.46	0.82	3
5.	Videos are very useful for educating farmers on improved practices and technologies	4.46	0.66	3
6.	Mobile is an emerging ICT tool for extension work in India	4.43	0.77	4
7.	Application of ICTs save time, cover the masses in short period and reduce the distance	4.40	0.80	5
8.	Through creative use of ICTs, quality of technology dissemination can be enhanced	4.32	0.80	6
9.	ICTs like multimedia, video, power point can be used to create a constructive and interesting learning environment	4.31	0.88	7
10.	Preference of mobile phones for disseminating knowledge, market and weather information to the farmers is increasing	4.26	0.72	8
11.	Through using ICTs, statistical analyses of the research data become very easy	4.23	0.89	9
12.	ICTs reduce the workload of KVK staff and enhanced the productivity of scientists	4.13	0.85	10
13.	ICT tools offer real advantages over traditional methods of training and extension	4.07	0.95	11
14.	ICTs are not suitable for extension activities in rural India	4.07	0.68	11
15.	Due to eye pain, back pain etc. the use of ICT is decreasing	3.98	0.83	12
16.	Preference for sending the Short Message Service (SMS) in extension is decreasing	3.91	0.79	13
17.	Use of ICTs is very time consuming and boring in extension work	3.90	0.89	14
18.	ICTs reduce interpersonal relationships between extension personnel and farmers	3.82	0.91	15
19.	ICTs are more useful tool for extension personnel when dealing with illiterate farmers	3.79	1.00	16
20.	Use of ICTs is very cumbersome for agricultural extension activities	3.70	0.82	17

In a nut-shell, study concludes that scientists of KVKs had positive perception towards ICTs for extension. It shows an ample scope to harness the benefits of ICTs in service delivery of extension system. The variables like education and trainings had positive effect while age and working experience had negative influence on perception of scientists. Hence, scientists may be encouraged for higher education and capacity building on ICTs. For attaining full use of ICTs, infrastructure at KVK as well as farmers' level needs to be strengthened.

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