Original Research Article

Adoption of ICT among the Farmers of Different Agro Climatic Zones of Uttar Pradesh

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A B S T R A C T

Present study assesses the adoption level of different ICT tools among the farmers in Uttar Pradesh and different factors affecting it. For the study five agro climatic zones of Uttar Pradesh were selected. From each zone a total of 45 farmers (registered for the mKisan services since last two years and cultivating wheat besides rearing at least two cattle or buffalo, completed at least one lactation) were selected, randomly. Thus, the total sample size for the study was 225. Most of the farmers (74.67 %) were in the low level of ICT adoption. Education, annual income, land holding, accessibility of information sources and social relation and participation were positively and significantly correlated with ICT adoption among the farmers.

Introduction

Uttar Pradesh is the most populous state and about 74.8 % rural house hold depends on agricultural activities for their livelihood (NSSO, 2014). It has a large livestock population, representing 10.2 % of the cattle and 28.1 % buffalo population in the country (GOI, 2012). Uttar Pradesh produced 24.19 million tonnes of milk during 2013-14 occupying first rank in milk production in the country. But in term of milk productivity/animal, Uttar Pradesh stood far behind the other states (BAH & FS, 2015). Estimates indicated that 60 % of farmers do not access any source of agricultural information and very small fraction of households (less than 6%) obtain

information about animal husbandry practices, resulting in huge adoption gap for recommended practices (NSSO, 2005). Information is one of the most critical resources for the agricultural development. Information communication technologies can provide opportunities to the farmers to be up to date with the agricultural information. Information communication technologies have capacity to deliver agricultural information from research stations to the farmers in quick and cost effective manner. Use of information communication technologies can make an efficient and effective research- extension – farmer linkage. In this concern government

of India started mKisan services in the year 2013 to provide a unified platform to all the agencies involved in agricultural information generation, information delivery, farmers and buyers to interact with each other. This SMS based system aimed to provide need based and timely agricultural information to the farmers. After launch of this service till April 2016 only 16.4 per cent farmers were registered under this programme in Uttar Pradesh (mKisan, 2017).

Keeping in view the importance of this national level advisory service and low percentage of its user registration in Uttar Pradesh it is essential to know what is the adoption level of the different information communication technologies among the farmers and different factors affecting it.

Materials and Methods

ICT adoption among the farmers was measured through ICT adoption index which is weighted mean of indices for three indicators viz., possession of ICT tools, accessibility of ICT tools and ICT utilization competencies among the farmers. Total 12 equiweighted items were considered under these three indicators for estimation of ICT adoption. Weight for each indicator was calculated as sum of weights of each item considered under that indicator.

Index value for each indicator was average of indices for each considered items. Index value for each item was calculated with formula:

$$I_{ij} = \frac{X_{ij} - \text{Min} X_{ij}}{\text{Max } X_{ij} - \text{Min} X_{ij}}$$

Where

i = 1, 2, 3……..n items

j = 1, 2, 3 indicators for ICT adoption

X_{ij} = Value of ith items of jth indicator

Having calculated the I_{ij} for all the items, the second step is to calculate the indices for various indicators of ICT adoption index. It is calculated as the simple mean of their respective items, that is:

$$\textbf{Possession of ICT tools}(Ip) = \frac{\sum_{i=1}^{5} I_{ij}}{5}$$

$$\textbf{Accessibility of ICT tools}(Ia) = \frac{\sum_{i=1}^{5} I_{ij}}{5}$$

$$\textbf{ICT utilization competency}(Ic) = \frac{\sum_{i=1}^{2} I_{ij}}{2}$$

Then, the ICT adoption index for each farmer as calculated as a weighted mean of the indices obtained from equation, i.e.

$$\textbf{ICT adoption index} = \frac{W_1 * Ip + W_2 * Ia + W_3 * Ic}{W_1 + W_2 + W_3}$$

Where W denotes the weight assigned to the respective indicator of ICT adoption index. For the study value of W_1, W_2 and W_3 were 0.42, 0.42 and 0.16.

Results for individual response were presented as frequency and percentage while categorization was done by equal interval method. Correlation analysis was done to assess the influence of different socio-economic and communicational characteristics of the farmers on the ICT adoption.

Results and Discussion

It is apparent from Table 1 that radio was possessed by most (69.33 %) of the farmers in Uttar Pradesh followed by T.V. (42.67 %), computer (11.11 %) and smart phone (10.67 %) for agricultural information. It was also found that most (58.22 %) of the farmers were listening radio programs on farmer's issue regularly followed by regular

watching of television for agricultural information (27.11 %), use of smart phone for agricultural information (08.44 %), fixed internet subscription (08.44 %) and use of computer for agricultural information (03.56 %). However very fewer farmers were found having ICT utilization competency as only 11.11 per cent can operate computer and only 10.67 per cent of farmers can operate smart phone. Finding are in line with the study of Kumar et al., (2014), who also found that 68.61 and 53.32 % of the rural livestock owners were using radio and television respectively in Muzaffarnagar district of Uttar Pradesh and Pal et al., (2009), who reported that 56.00 and 52.00 % farmers were using radio and television for agricultural information in Bundelkhand region of Uttar Pradesh. Table 2 divulges that most of the farmers (74.67 %) were in the low level of ICT adoption followed by medium (17.78 %) and high (07.55 %) level of ICT adoption. ICT adoption level was found similar in all the agro climatic zones. In India rural wireless teledensity estimated as 52.84 which is around one third of urban area (TRAI, 2017). Adoption of computer and internet use in rural area of Uttar Pradesh was 5 % and 14.3 % respectively (NSSO, 2014). Abbas, (2015) also found that only 9.3 % of villagers in Uttar Pradesh were using phone for calling, SMS, E-mail, of Facebook and other Social Media tools and web based apps like Whatsapp.

The results in Table 3 revealed that education, annual income and message utilization index were having highly significant ($p<0.01$) and positive relation with ICT adoption among the farmers. Whereas land holding, accessibility of Information Sources and social relation and participation were positively and significantly ($p<0.05$) correlated with ICT adoption among the farmers. Mittal and Mehar, (2015) and Ali, (2011) worked in Indian state in indo gangatic region and and reported that variables like education, farm size and income have positive and significant correlation with adoption of ICT tools. Pal et al., (2009) in Bundelkhand region reported that adoption of different ICT tools were significantly and positively related with education and land holding of the farmers.

Table.2 Distribution of respondents acoording to ICT adoption among the farmers in different zone of Uttar Pradesh

Categories	North Eastern Zone (n=45)	Bundelkhand Zone (n=45)	Central Plain Zone (n=45)	Mid- Western Zone (n=45)	Western Zone (n=45)	Pooled (N=225)
Low (0.00 to 0.33)	36 (80.00)	39 (86.67)	33 (73.33)	31 (68.89)	29 (64.44)	168 (74.67)
Medium (0.34 to 0.66)	7 (15.56)	5 (11.11)	8 (17.78)	10 (22.22)	10 (22.22)	40 (17.78)
High (0.67 to 1.00)	2 (04.44)	1 (02.22)	4 (08.89)	4 (08.89)	6 (13.33)	17 (07.55)
Mean ± SD	0.28 ±0.13	0.24 ±0.15	0.36 ±0.11	0.38 ±0.13	0.41 ±0.16	0.33 ±0.13
F value 0.821						

Table.1 Distribution of respondents according to ICT tools possession, their accessibility and perceived utilization competencies in different zone of Uttar Pradesh

	North Eastern Zone (n=45)	Bundelkhand Zone (n=45)	Central Plain Zone (n=45)	Mid-Western Zone (n=45)	Western Zone (n=45)	Pooled (N=225)
1. Possession of ICT tools						
Radio	33 (73.33)	30 (66.67)	28 (62.22)	34 (75.56)	31 (68.89)	156 (69.33)
Television	15 (33.33)	16 (35.56)	20 (44.44)	17 (37.78)	28 (62.22)	96 (42.67)
Smart phone.	5 (11.11)	3 (6.67)	3 (6.67)	5 (11.11)	8 (17.78)	24 (10.67)
Computer	4 (8.89)	4 (8.89)	3 (6.67)	6 (13.33)	8 (17.78)	25 (11.11)
2. ICT utilization competencies						
Can operate computer	4 (8.89)	3 (6.67)	4 (8.89)	6 (13.33)	8 (17.78)	25 (11.11)
Can operate smart phone	3 (6.67)	3 (6.67)	3 (6.67)	5 (11.11)	8 (17.78)	24 (10.67)
2. Accessibility and utilization of ICT tools						
Fixed internet subscription	4 (8.89)	3 (6.67)	3 (6.67)	3 (6.67)	6 (13.33)	19 (8.44)
Use computer for agricultural information	2 (4.44)	1 (2.22)	1 (2.22)	2 (4.44)	2 (4.44)	8 (3.56)
Use smart phone for agricultural information	4 (8.89)	3 (6.67)	1 (2.22)	5 (11.11)	6 (13.33)	22 (8.44)
Regular listening of radio on farmer's issues	28 (62.22)	25 (55.56)	23 (51.11)	29 (64.44)	26 (57.78)	131 (58.22)
Regular watching of television for agricultural information	9 (20.00)	10 (22.22)	14 (31.11)	11 (24.44)	17 (37.78)	61 (27.11)

Table.3 Influence of socio- personal and communicational characteristics of the farmers on ICT adoption

Variables	'r' Value
Age	0.193
Education	0.327**
Land holding	0.237*
Annual income	0.271**
Experience in livestock farming	0.068
Accessibility of Information Sources	0.113*
Message Utilization Index	0.381**
Herd Size	0.177
Social relation and participation	0.194*

It can be concluded that radio and television are the main ICT tools for access the agricultural information and farmers have low to medium level of ICT adoption. Positive and significant influence of education on ICT adoption implies that education help farmers to make aware of various agricultural information providing ICT tools and also how to operate them on the other hand illiterates were unaware of their existence and usage and hence did not show much interest towards them. Higher annual income of the farmers facilitates their accessibility for possession of various agricultural information providing ICT tools.

Higher message utilization index and high accessibility to different agricultural information sources means higher exposure to various new agricultural technologies. Better results of use of these technologies at farm level create an interest among the farmers to use the others agricultural information providing ICT tools to solve their farm related issue. High social relation and participation create a social pressure and encouraged the farmers to meet their agricultural information needs that were available through various ICT tools. Use of ICT in agricultural information dissemination is of paramount importance. As the new agricultural technologies are developed by research institution, their dissemination to farmers is very crucial. In Uttar Pradesh radio and television are the main source for agricultural information. Adoption of ICT tools like smart phone and computer are still very low, which can be an important tool to access need based agricultural information. Regional agriculture and animal husbandry related information should be provided through radio and television on regular basis. Beside this farmers should be educated and trained on utilization of modern ICT tools like smart phone, computer etc. So as to enable them to search agricultural information of their need through various sources. Higher adoption of ICT tools can also lead to a synergistic effect on the utilization of mKisan services leading to better agricultural production and productivity in the state.

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