

## RESEARCH ARTICLE

# Effectiveness of ICT-based Agro-met Advisory Services in Addressing the Information Needs of Farmers in Assam

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### ABSTRACT

*In the present global scenario, which witnesses extreme climate change amounting to frequent vagaries of weather, the need for agro-met advisory services becomes noteworthy. In this digital era, ICT offers enormous potential to disseminate agro-met information and is being used by various stakeholders to cater the needs for information by the farmers. The study was conducted during the year 2021 with 100 beneficiaries of ICT-based agro-met advisory services furnished by KVK, government departments and various NGOs in Darrang district of Assam to assess its effectiveness. The effectiveness was measured using five dimensions. Nearly 3/4<sup>th</sup> (74%) of farmers in the study area perceived the information to be timely. In terms of quality, utility, ease of understanding and satisfaction, majority of the respondents considered it to be of moderate level. The radar chart presented using normalized values of different components of effectiveness depicts that ease of understanding contributes most to the effective use of the services. Relational analysis through multivariate regression found that Experience of farming significant at 10% level. Variables Education and ICT tools used were significant at 5% level. R<sup>2</sup> (Coefficient of determination) value being 0.556, it was concluded that 55.6% of variance in the dependent variable i.e., effectiveness of agro-met advisory services was due to explained factors. Hence while selecting the beneficiaries for agro-met advisory services, factors like higher experience in farming, higher level of education and use of ICT tools may be considered to increase the effective use of these services.*

**Key words:** Agro-met advisory services; Effectiveness; ICT; Information needs; Weather.

The fact that agriculture without good weather is far-fetched, is indubitable. A reliable weather is conducive for good agricultural output as all the stages in agriculture is weather dependent. Agriculture is central to survival for millions in India. The agricultural domain field is a knowledge intensive sector in which accurate, correct, and timely information is necessary (Pathak and Sharma, 2021). The vagaries in the weather and climatic elements are out-of-hand phenomena for farmers hence along with the other inputs, information regarding weather becomes utmost important. Agro-met advisory services acts as vital tool for the farmers to minimize the weather hazards by providing tailor-made timely and accurate information from sowing to harvesting of crop (Jagadeesha et al., 2010). Proper decision making for managing of agricultural risks can be aided and ensured

by effective weather and climate information at district level which will lead to economically viable and ecologically sustainable agricultural systems (Chaubey et al. 2018). Although the inception and circulation of agro-meteorological information had an impressive development, the challenge, however, lies in escorting the information within the access of all the farmers as small farmers still have slender access to information (FAO, 2019). Digitalization of communication networks has opened access the information to large number of people in shortest span to time, in economical way (Shanmuka et al., 2022). Extension practitioners now progressively champions ICT enabled services as an alternative to conventional face-to-face extension as it provides potentially relevant, actionable, timely, and low-cost information (Kansiime et al., 2019). Himeur and Ikhlef (2023), stated that ICT can be employed

to improve the advisory services in agriculture. With the expanding ingress of mobile phones coupled with escalating evolution in the use of Information and Communications Technology (ICT) services such as tele-centres, SMS, videos and mobile applications, ICTs are anticipated to play a propitious role in guiding information within the ambit of farmers (*Mittal, 2012*). *Kumari et al. (2022)* emphasized that farmers used ICT tools to gain information on different agricultural practices till post-harvest stages. However, using these ICT tools may pose assorted constraints viz., poor internet connectivity, lack of technical literacy etc. as highlighted by *Bandhavya et al. (2022)* in their study. Therefore, the efficiency of these ICT based agro-met advising services should be looked after, which will assist the district extension agency in effectively utilizing them to communicate weather information to farmers. *Khan et al. (2020)* observed in their study that 44.55 per cent of the respondent believed mobile-based agro-advisory services are moderately effective, while 32.72 per cent believed they are highly effective. *Kumbhare et al. (2019)* in their study stated that majority (85%) of respondents said that mobile-based advisory messages were received promptly and that scientist took into account local needs and preferences of farmers while crafting the messages and hence, 80 per cent of respondents said that information obtained via messaging were adapted to local field conditions. *Singh et al. (2015)* iterated in their study that 46.66 per cent of farmers found the services rendered by ICT based advisory platform, mKRISHI®, to be highly effective. *Srinivas et al. (2017)* revealed in the evaluation conducted on mobile based agro-advisory services that 73.3 per cent of cotton farmers found the content to be very useful. The study conducted by *Manjushree et al. (2022)* revealed that nearly half of the farmers had an unfavorable perception towards the agro-met advisory services and perceived that the advices were not relevant for the management of farm operations.

North-Eastern state Assam, is particularly vulnerable to climate change in the country in accord with the report titled 'Climate Vulnerability Assessment for Adaptation Planning in India Using a Common Framework, 2019-2020', by Department of Science and Technology. Lack of availability of centrally funded crop insurance schemes, high prevalence of rain fed agriculture, limited forest area per hundred rural populations etc. were some of the major root

causes for vulnerability of the state. Darrang district of Assam, according to the report, is India's fourth most vulnerable district. Improved utilization of climate knowledge and climate risk technology is required to deal with agro meteorological risks and uncertainties. Krishi Vigyan Kendra, State agricultural department and various NGOs are engaged in providing timely and relevant ICT based agro-met information to the farmers through weekly e-bulletin (released every Tuesday and Friday at KVK website and circulated via social media platforms like Facebook, WhatsApp etc.), mobile application (Damini and Meghdoot), bulk SMS, etc.

## METHODOLOGY

Darrang district of Assam (India) was selected purposively for the study given its extreme vulnerability to the climate as was done in their study by *Workneh and Ponnusamy (2016)*. Two blocks with highest number of beneficiaries of agro-met advisory services through ICT platforms provided by KVK Darrang were purposively selected, viz., Pachim Mangaldai and Sipajhar. A multistage sampling technique for the selection of blocks, villages and respondents was applied. Two villages from each block and 25 respondents from each village were selected randomly comprising 100 respondents as sample size for the study. Research design, ex-post facto was used for the study. Data collection was done personally through structured interview schedule.

Effectiveness of Agro-met advisory services were measured using 5 dimensions namely timeliness of information, the quality of information, utility of the information provided, satisfaction of farmers and ease of understanding of the information. The measurement of effectiveness of Agro-met advisory services is explained through a three-point and four-point continuum scale with 10 statements each in timeliness, quality and utility of information, 7 statements in satisfaction and 5 statements each in ease of understanding and quality of information. Further the respondents are classified into low, medium and high categories using mean and standard deviation. The total score of each component is obtained by adding the score on respective continuum scales and further addition of each components scores resulted in the final scores of overall effectiveness, which was considered for regression analysis. The collected data were scored, quantified, categorized, tabulated and analysed with the help of frequency, standard

deviation, mean and regression analysis respectively. The normalized values and their standard errors of each of the 5 components of effectiveness were calculated and Radar chart was constructed using the values to determine which component contributes highest value to overall effectiveness of agro-met advisory services.

**RESULTS AND DISCUSSION**

*Effectiveness of ICT based agro-met advisory services:* Table 1 shows different components of effectiveness of ICT based advisory services. Majority (74%) of the respondents found the advisory services to be timely in nature as the e-bulletin was provided every Tuesday and Friday and the mobile applications gave real-time weather information. Regarding quality of the information, 73 per cent of the farmers perceived it to be of very good quality. More than 2/3<sup>rd</sup> (68%) of the farmers considered the information to be useful to them as the information in e-bulletins were tailor-made by KVK for the district. 59 per cent of the beneficiaries were satisfied with the provided information. With respect to ease of understanding, 73 per cent farmer perceived the obtained information to be easily understood as the e-bulletin was provided in simple non-technical way in local language i.e., in Assamese.

The Table 2 encapsulates all the dimensions of effectiveness that are timeliness, quality, utility,

**Table 2. Distribution of respondents according to overall effectiveness of ICT based agro-met advisory services (N=100)**

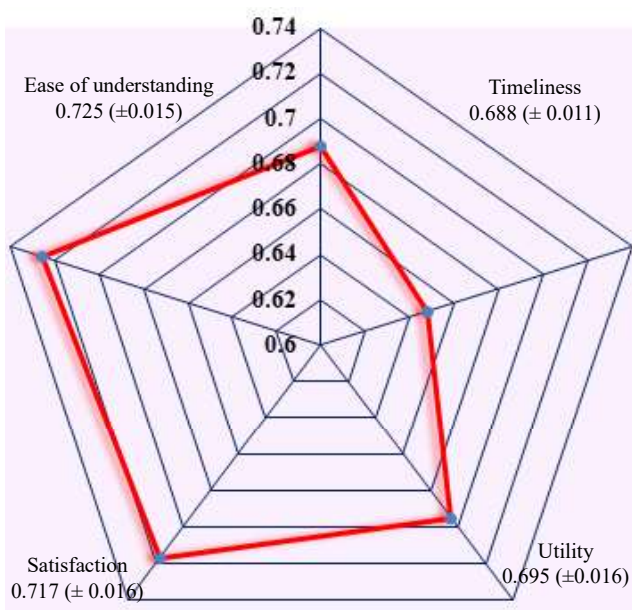
Category	No./%
Low ( $\leq 83.62$ )	15
Moderate (83.63-115.78)	65
High ( $> 115.78$ )	20
$\bar{X}=99.7, \sigma=16.08$	

satisfaction, and ease of understanding by summing them up. Data reveals that about 2/3<sup>rd</sup> (65%) of the respondents considered the effectiveness of agro-met advisory to be of moderate level followed by 20 per cent of the respondents who considered it to be highly effective.

Radar chart was constructed using the normalized values and standard errors of five components of Effectiveness (Fig.1) and Table 3, as was used in their study by Lal et al. (2021). The chart highlights that

**Table 1. Data representing Effectiveness of ICT based agro-met advisory services (N=100)**

Components	No.	$\bar{X}(\sigma)$
<i>Timeliness</i>		
Untimely ( $\leq 14.98$ )	14	17.89
Timely (14.99-20.8)	74	(2.91)
Very timely ( $> 20.8$ )	12	
<i>Quality of information</i>		
Good ( $\leq 17.53$ )	11	22.04
Very good (17.54-26.55)	73	(4.51)
Excellent ( $> 26.55$ )	16	
<i>Utility of information</i>		
Moderately useful ( $\leq 16.23$ )	14	20.86
Useful (16.24-25.49)	68	(4.63)
Highly useful ( $> 25.49$ )	18	
<i>Satisfaction of farmers</i>		
Moderate ( $\leq 16.81$ )	20	21.52
High (16.82-26.23)	59	(4.71)
Very High ( $> 26.23$ )	21	
<i>Understanding of farmers</i>		
Moderately understood ( $\leq 13.8$ )	11	17.42
Easily understood (13.81-21.04)	73	(3.62)
Very easily understood ( $> 21.04$ )	16	



**Fig. 1. Contribution of different components to effectiveness of ICT based agro-met advisory services**

**Table 3. Model summary of effectiveness of ICT based agro-met advisory services (dependent variable) of the respondents**

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	SE of the Estimate
1	.745 <sup>a</sup>	.556	.482	11.633

(a). Predictors: (Constant), experience in farming, occupation, land holding, annual family income, educational qualification, family type, social participation., mass media exposure, extension contact, extension participation, ICT tools used, Information needs, Information channel, Information sources.  
 (b). Dependent Variable: Effectiveness of ICT based agro-met advisory services.

ease of understanding, among all the components, contribute highest value to effectiveness of ICT based agro-met advisory services as proper understanding of these information leads to their effective use in field condition. Other components, like quality and utility had lower contribution. Thus, the dimension of quality and utility should further be improved to increase the effectiveness of these services.

*Relational analysis of effectiveness of ICT based agro-met advisory services and selected independent variables* : Regression analysis had been used in studies by Lal et al. (2021) and Shukla et al. (2022) to establish the causal relationship between independent and dependent variables. A range of constants (predictor variables) that might act as explanatory variables for effectiveness of ICT based Agro-based advisory services were collected. These variables include Age, Gender, Caste, Family Type, Educational Qualification, Experience in Farming, Social Participation, Family Annual Income, Occupation, Land holding size, Mass media Exposure, Extension Contact, Extension contact, Extension Participation, Information needs, Information Seeking behaviour and ICT tools used by farmers. Thus, initially these 17 variables are selected to deduce the relational analysis of dependent with independent variables but out of which Age, Gender and caste were excluded because they were not fitted in the multivariate regression model.

Table 4 reflect the regression analysis of Effectiveness of agro-met advisory services with predictor variables. The  $R^2$  (Coefficient of determination) value being 0.556, it can be concluded that 55.6 per cent of variance in the dependent variable i.e., effectiveness of agro-met advisory services was due to explained factors and rest 44.4 per cent variance attributed due to some additional factors which are not considered in the study. The variables which found to be have significant influence on dependent variable are discussed below:

*Experience in farming*: It is the time span for which the farmer is engaged in farming. This variable was statistically significant at  $p < 0.10$  with positive t-value 1.940 explaining that increase in experience might likely to increase the effectiveness. Farmers with higher experience have more familiarity with the vagaries of weather over the years and may have realised that it is not in their control. Hence, they understand the need of such ICT based agro-met advisory services to provide them with timely need-based information which will aid them in decision making.

**Table 4. Regression analysis of independent variables with Effectiveness of agro-met advisory services**

Factors	b values	SE	t value	p-value
Constant	56.037	11.135	5.033	
Experience in farming	0.353	0.182	1.940	0.056*
Occupation	1.468	1.004	1.463	0.147
Land holding	-4.103	3.352	-1.224	0.224
Annual income	0.898	1.081	0.831	0.408
Education qualification	3.732	1.838	2.030	0.045**
Family type	1.850	2.512	0.737	0.463
Social participation	-1.415	1.815	-0.779	0.438
Mass media exposure	1.097	0.750	1.463	0.147
Extension contacts	0.599	1.238	0.484	0.630
Extension participation	0.821	0.903	0.909	0.366
ICT tools used	0.931	0.427	2.183	0.032**
Information needs	0.627	0.638	0.983	0.328
Information sources	-0.0915	0.769	-1.189	0.238
Information channels	-0.505	0.687	-0.735	0.464

$R^2=0.556$ ; \*\*Significance at 5 per cent level;

\*Significance at 10 per cent level

*Education*: It was statically significant with positive t-value 2.030 at  $p < 0.05$  enabling the educated farmer to understand the importance of such agro-advisory services and use them effectively. The more educated a farmer is, the more he/she may be able to utilize the knowledge obtained from various sources in solving problems in their own situation. Therefore, education makes it easier for them to learn skills to utilize the ICT tools efficiently.

*ICT Tools used*: The predictor variable ICT tools used was marked down to be positively significant at  $p < 0.05$  with t-statistic value 2.183 explaining the use of different ICT tools make the farmer aware of advantages that they can obtain from using them. As they have more exposure to ICT tools, they become efficient in skills to use it for their purpose. Hence, more a farmer uses ICT tools, more effective is the agro-met advisory services in communicating them their information needs.

## CONCLUSION

The study was conducted to assess the effectiveness of ICT-based agro-met advisory services in addressing the information needs of farmers. Weather dependent agriculture demands for timely, relevant and accurate information to minimize the risks. The present age, widely known as the information era is highly revolutionary and it will be unimaginable to discover a sector in the global economy that is eluded from the advantages of information technology. ICT offers

enormous potential to disseminate need-based agro-met advisory services efficiently. The beneficiaries of the services in the study area perceived the effectiveness of ICT based agro-met advisory services to be of moderate level, which denotes a wide scope for improvement and an increase in accessibility of these services. The findings highlight that among the 5 components of effectiveness, ease of understanding contributes highest to effectiveness of ICT-based agro-met advisory services. Regression analysis revealed variables experience in farming, educational qualification and ICT Tools used to be positively significant with effectiveness. These factors, thus can be considered while selecting the beneficiary for agro-met advisory services. Farmers with more years of experience, higher education and higher exposure to ICT tools can make effective use of ICT-based agro met advisory services for decision making.

### CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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