Original Research Article

Identification and Prioritization of Challenges in Accessing ICT Tools by Agricultural Extension Professionals in Northern Districts of West Bengal

ABSTRACT

The potential of Information and Communications Technologies (ICTs) for agriculture in the form of various knowledge management portals has been harnessed by various agricultural developmental organizations and so on. But still, there is a gap in the rural community's adoption and access to such technology. There are many reasons for this adoption lag, in the case of identifying such focused issues in accessing the ICTs, will be the key to addressing those challenges. In such a resilient backdrop, this article investigates by identifying and prioritising the challenges in accessing ICT tools for sustainable agriculture by agricultural system actors in the northern districts of West Bengal. The present study was conducted in two northern districts of West Bengal viz. Cooch Behar and Alipurduar districts. Two hundred respondents included from these two districts were selected randomly for the present study. The sample includes 60 percent of the farmers and 40 percent of extension personnel including scientists from State Agriculture University, Krishi Vigyan Kendra, Assistant directors of State Department of Agriculture, input dealers and grassroots-level extension professionals working in various farmers, clubs and NGOs. These respondents were interviewed through a structured, pre-tested interview schedule developed to measure the extent of ICTs usage designed with the help of the online Google forms and offline interview schedule. The obtained data were processed with the help of statistical tools like frequency, percentage, mean, standard deviation and Rank Based Quotient (RBQ). The constraints identified were, 'lack of training and practical exposure towards ICTs' (64.8%), followed by 'high cost of ICT tools (64.55%), 'insufficient local language information' (62%), 'low network connectivity' (60.90%), 'unavailability of different ICT tools' (60.60%), 'lack of skill in handling ICTs' (58.65%), 'lack of confidence in operating ICTs' (55.40%), 'high cost of repairing for ICT devices' (49.40%), 'irregular power supply' (37.95%), and 'lack of awareness of benefits of ICTs' (36.40%).

Key words: *Constraints in ICT tools access; Sustainable livelihood; Rank Based Quotient; ICTs for Agricultural Development, Prioritization of challenges*

INTRODUCTION

Information and knowledge are crucial for agricultural development in today's knowledge-driven environment. Agricultural growth and development are mostly dependent on sound decision-making and appropriate knowledge support. “Agricultural Extension, in the current scenario, is rapidly shifting globally and is recognized as an indispensable mechanism for saving knowledge (information) and advice as an input for modern farming and the use of ICT in actualizing so has made the involvement of practitioners” (Richardson, 2003). Over the last decade, the country's use of ICTs has expanded rapidly, particularly mobile phone and internet usage. The current pandemic crisis has compelled individuals to connect to the Internet for a range of services. We have observed tremendous growth in the number of people using the internet in the country, from 10% in 2014 to 50% during the Covid 19 epidemic in 2019, then dropping slightly to 48.70% in 2022 (Basuroy, 2023).

In addressing the challenges of information needs of the agricultural stakeholders, the benefits of ICT tools can be harnessed which can act as a catalyst in reducing the costs and minimize the proximity among the system actors. Since ICT has a significant function in building linkage between research, extension and the farmers to the markets it can increase the capacities among the experts and the agricultural communities for sustainable agriculture and restoring social sustainability. And even farmers can now use ICT tools to manage their farming activities, from crop selection to the monitoring of production. Access to information on inputs and advisory services – By using their mobile phones or the Internet, young farmers/agripreneurs get information on the availability, location and price of inputs. Exploring multiple sources of inputs enables them to make better-informed decisions about where and when to buy (World Bank, 2011). The benefits harnessed by utilizing of ICT tools for agricultural extension and capacity building were well documented (Hafkin and Odame, 2002; Richardson, 2005; Zijp, 1994). However, it is expected that the usage of ICT is to be penetrated deeper into the rural community. This is because ICT use enables extension officers to play complementary roles in accessing and transferring relevant information to farmers (Meera *et al.,* 2004) and also helps farmers to utilize such information to solve their problems.

Despite all these benefits, still there is an adoption gap for such novel technology because of the constraint perceived by the stakeholders. Keeping all these in view the present study has been envisaged to Prioritize the problems of agricultural system actors in accessing ICT tools for Sustainable Agriculture in the northern districts of West Bengal.

MATERIALS AND METHODS

An *ex-post facto* research design was followed for the present study. It was conducted in two northern districts of West Bengal *viz.* Cooch Behar and Alipurduar districts during 2018-19.

An exhaustive list of agriculture system actors who are using ICTs for agricultural information from these two districts was prepared with the help of the Officials of the Department of Agricultural Extension, Cooch Behar Krishi Vigyan Kendra (KVK) of Uttar Banga Krishi Viswavidyalaya and active farmers clubs in the study area. From the list, a total number of 200 respondents, 40 percent i.e., 80 extension professionals were selected proportionately from the selected blocks which includes extension personnel from the University Extension system, i.e., from KVKs, Public sector i.e., respondents from the State Department of Agriculture (SDA) and service providers like respondents from NGOs/farmers' clubs and agricultural input details, and the rest 60 percent i.e., 120 farmers from NGOs/farmers' clubs who are actively using ICT tools as a source of information were selected for the present study. These two hundred respondents were interviewed through a pre-tested structured interview schedule designed to measure the extent of ICT usage with the help of both an online Google form and an offline interview schedule. More than fifty percent of the data was collected from the respondents over digital devices like computers, tablets and smartphones through a *URL* link sent to them. Variables like age, education, experience, social participation, annual income, annual expenditure, smart gadgets possessing and sources of agricultural information were included. The data obtained were processed with the help of statistical tools like frequency, percentage, mean, standard deviation and the preferential ranking technique was used with the help of the Rank Based Quotient (RBQ) method.

Preferential ranking technique

Unlike other simple ranking techniques, this technique considers the average affected area as well as the percentage of constraints as perceived by the respondents to prioritise the constraints based on overall magnitude value. The constraint analysis through the Preferential Ranking Technique involves the following steps (Sabrathnam, 1988).

1. Identification of key informants (KI): Key informants, who are familiar with the existing situations, like Panchayat presidents, local leaders, progressive farmers, and grassroots level extension personnel are identified first. These selected key informants are individually asked to list out the constraints faced in the study area. Later the listed common constraints are grouped into ten constraints.
2. Identification of respondents:

   Respondents were randomly selected for this study from the list of agricultural system actors in the proportion of 60 per cent farmers and 40 per cent extension service providers which include extension personnel from State Agricultural University, State Department of Agriculture officials, Agricultural Technology Management Agency (ATMA) and extension staff of grassroots non-government organisations.

3. Quantification of data: Rank Based Quotient (RBQ) is calculated for each constraint quoted by the respondents with the formula

$$Rank\ Based\ Quotient\ (RBQ) = \left[\Sigma f_i \frac{(n+1-i)}{Nn}\right] X100$$

Where,

fi =Frequency of farmers for *i*th rank

i = Concerned ranks,

N = Number of respondents

n = Number of ranks

RESULTS AND DISCUSSION

Demographic Profile of the Respondents: The demographic profile of the respondents has the basic information on age, education, occupation, experience, social participation, annual income, annual expenditure, landholding, smart gadgets possessing, and sources of agricultural information (Table 1).

Table 1. Personal Profile of the Respondents (N=200)

S.No	Category	Frequency	Percent	
1.	**Age**			Range =22-75 Mean =40.15 SD=12.54 CV=31.23%
	Young Aged (21-35 years)	79	39.5	
	Middle Aged (36-44 years)	52	26.0	
	Old Aged (45-75 years)	69	34.5	
2.	**Education**			
	Can read only	2	1	Range = 1-7 Mean = 4.51 SD= 1.0 CV= 22.27%
	Can read and write	1	0.5	
	Primary	5	2.5	
	Middle	24	12	
	High School	56	28	
	Graduate	70	35	
	Post Graduate	42	21	
3.	**Occupation**			
	Business	66	33	Range =1-5 Mean = 3.64 SD= 1.00 CV= 27.62%
	Independent Profession	13	6.5	
	Cultivation	74	37	
	Service	47	23.5	
4.	**Experience**			Range =1-31 Mean =9.80 SD=7.65 CV=78.07%
	Low level (1-7 years)	85	42.5	
	Medium level (8-13 years)	64	32.0	
	High level (14-31 years)	51	25.5	
5.	**Social Participation**			Range =1-6 Mean =2.23 SD=1.74 CV=78.08%
	Low (1-2)	164	82.0	
	Medium (3-4)	11	6	
	High (5-6)	25	12	
6.	**Annual Income**			Range =6-100 Mean =28.18
	Low (6-19)	1	47.0	

	Medium (20-37)	68	34.0	SD=22.58 CV=80.14%
	High (38-100)	38	19.0	
7.	**Annual Expenditure**			Range =6-87 Mean =25.20 SD=19.99 CV=79.33%
	Low (6-17)	97	48.5	
	Medium (18-34)	65	32.5	
	High (35-87)	38	19.0	
8.	**Land Holding**			Range =0.1-5 Mean =2.18 SD=1.64 CV=75.32%
	Low (0.1-2.18 acre)	123	61.5	
	Medium (2.18-3 acre)	14	7.0	
	High (3-5 acre)	63	31.5	
9.	**Smart gadgets possessing**			Range =1-10 Mean =6.64 SD=3.12 CV=46.98%
	Low (1-5)	55	27.5	
	Medium (6-7)	71	35.5	
	High (8-10)	74	37.0	
10.	**Source of Agriculture Information**			Range =1-7 Mean =4.15 SD=1.71 CV=41.23%
	Low (1-3)	81	40.5	
	Medium (4-5)	76	38.0	
	High (6-7)	43	21.5	

Table 1 reveals that the majority of the agricultural system actors which includes farmers and extension service providers, they belong to the age group 21-35 years which represents young aged respondents (39.5%) followed by the age group 45-75 years which represents old aged group respondents (28.8%) and 33-40 years which represents middle-aged respondents (27.4%). When it comes to the education of the actors, the majority of them are graduates (35%), followed by high school (28%), post-graduates (21%), and middle school (12%). There are few respondents from the farmers who possess primary education (2.5%), who only read (1%) and who can read and write (0.5%). Looking at the occupation of the respondents, the majority of them were involved in cultivation (37%) followed by business (33%), service (47%) and independent profession (6.5%). The interesting thing about the occupation is that some of the farmers whose primary source of income is farming are also involved in doing local business as a secondary source of income to support their families. The majority of the respondents belongs to 1-7 years i.e., low level of experience (42.5%) followed by 8-13 years i.e., the medium level of experience (32.0%) and 14-31 years i.e., high level of experience (25.5%). The social participation of the respondents is found to be low with 1-2 membership (82%), followed by the membership of 5-6 membership i.e., high level of social participation (12%) and 3-4 membership i.e., (6%). In the present study both the annual income and the annual expenditure were found to be low 6-19 i.e., low (47.0%), followed by 20-37 i.e., medium (34.0%), and 38-100 group i.e., high annual income (19.0%) and 6-17 i.e., low (48.5%), followed by 18-34 i.e., medium (32.5%), and 35-87 group i.e., high annual expenditure (19.0%).The majority belongs to the group 0.1-2.18 acre i.e., low landholding (61.5%), followed by 3-5 acre i.e., high landholding (31.5%), and 2.18-3 acre i.e., medium landholding (7.0%). When we look at the smart gadgets possessed by the

respondents, the majority belongs to the score category of 8-10 who has a high level of possessing smart gadgets (37.0%), followed by the category of 6-7 score who have has a medium level in possessing the smart gadgets (35.5%), and score category of 1-5 who has a low level in possessing the smart gadgets (27.5%). The study also revealed that the majority belongs to the group score 1-3 which represents a low source of agricultural information (40.5%), followed by the 4-5 score which represents a medium source of agricultural information (38.5%), and 6-7 which represents a high source of agricultural information (21.5%).

Table 2: Rank Based Quotient (RBQ) for the constraints identification and prioritization through the Preferential Ranking Technique

S. No	Listed Constraints	Ranks										RBQ (%)	Rank
		1	2	3	4	5	6	7	8	9	10		
f	Lack of training and practical exposure towards ICTs	12	61	1	19	0	75	16	15	1	0	**64.80**	**I**
b	High cost of ICT tools	26	18	36	44	12	17	14	1	25	7	**64.55**	**II**
g	Insufficient local language information	46	5	32	0	42	21	17	8	1	28	**62.00**	**III**
d	Low Network connectivity	41	16	33	12	1	32	14	18	7	26	**60.90**	**IV**
a	Unavailability of different ICT tools	17	44	44	9	17	12	0	0	12	45	**60.60**	**V**
e	Lack of skill in handling ICTs	12	26	12	1	62	8	68	10	1	0	**58.65**	**VI**
c	Lack of confidence in operating ICTs	2	18	15	56	38	13	0	23	17	18	**55.40**	**VII**
h	High cost of repairing for ICT devices	12	1	13	38	10	0	70	37	19	0	**49.40**	**VIII**
j	Irregular power supply-Electricity	21	12	12	1	0	21	0	0	100	33	**37.95**	**IX**
i	Lack of awareness on benefits of ICTs	12	2	1	19	18	0	0	88	17	43	**36.40**	**X**

From Table 2. it could be understood that the following constraints which have been identified through the preferential ranking technique are like this; 'lack of training and practical exposure towards ICTs' (64.8%) is found to be the most intricate problem facing by the agricultural system actors, followed by 'high cost of ICT tools (64.55%), 'insufficient local language information' (62%), 'low network connectivity' (60.90%), 'unavailability of different ICT tools' (60.60%), 'lack of skill in handling ICTs' (58.65%), 'lack of confidence in operating

ICTs' (55.40%), 'high cost of repairing for ICT devices' (49.40%), 'irregular power supply' (37.95%), and 'lack of awareness of benefits of ICTs' (36.40%).

Lack of training and practical exposure towards ICTs

At present, there are some crop-specific agricultural portals developed by ICAR institutes and other private firms, and mobile apps developed by government institutions and private start-ups are available for both farmers and extension service providers. But handling these online portals, mobile apps and other ICT tools is difficult without imparting training and practical hands-on to such technologies. In this present study, among the constraints identified through preferential ranking technique; 'lack of training and practical exposure towards ICTs' is found to be the most intricate problem faced by the agricultural system actors with 64.8 per cent of respondents ranking this issue as the most prioritized one. These findings are similar to the study done by Raksha *et.al* (2017) and Sunil Rajoria *et.al* (2022) which stated that 'Lack of training on ICTs' had a high magnitude with the RBQ of 54.31% with the rank I.

High cost of ICT tools

The high cost of ICT tools is one of the most important and basic barriers to restrict farmers and extension service providers in the accesses of ICTs. While the cost of ICT tools have been reduced in recent times, but the prices of tools are still a challenge to the rural community. The second most serious constraint identified is 'high cost of ICT tool' faced by the agricultural system actors in the study area. Among the total respondents, the RBQ value is 64.55% which is ranking II. These results are in line with the study of Akpabio *et.al* (2007).

Insufficient local language information

The third major constraint experienced by the agricultural system actors in the study area was 'insufficient local language information' through ICTs. Even though there are many initiatives that provide information for the actors, most of the information was in the English language and only allows the user to translate navigation options to a regional language in many cases. This makes it the user difficult to read and understand the main content. Among the total respondents, the RBQ value of this constraint was 62% which is ranked III. Similarly, the findings of Sumi and Singh (2018) have also revealed that the third most constraint faced by both farmers and extension personnal was 'Insufficient regional specific information and expatriate language'.

Low Network connectivity

Having a weak or a bad network signal strength is one of the most frustrating issues one can face during accessing the ICT tools. TRAI has announced that the total number of telephone subscribers in the country has increased to 1,203.47 million at the end of April-2021. But the

reality on the other side is low and very weak network signal because of the network overloaded in the bandwidth especially in the rural areas. Among the total respondents, the RBQ value of this constraint was found to be 60.90% which is ranked IV.

Unavailability of different ICT tools

Despite the greater role ICTs in Indian agriculture, finding ICT tools in the rural areas is still one of the major challenges faced by the agricultural system actors in the study area. They need to depend on major cities for purchase and servicing. Among the total respondents, the RBQ value of this constraint is found to be 60.60% which is ranked V.

Lack of skill in handling ICTs

It has been observed from the present study that there was a lack of skills in handling ICTs. Among the total respondents, the RBQ value of this constraint was found to be 58.65% which is ranked VI. The majority of the farmers and extension service providers are possessing ICT tools personally and, in their workplace, but they are not using them effectively because of this constraint. These findings are in agreement with the finding of Mooventhan and Philip (2012).

Lack of confidence in operating ICTs

The lack of confidence in operating ICTs among farmers also hindered the farmers in using ICTs (Agwu *et al*., 2008). Among the total respondents, the RBQ value of this constraint is found to be 55.40% which is ranked VII. From the study, it is found that many of the respondents are well aware of the benefits of ICTs in agricultural extension, but only because they are not well equipped with handling these technologies, they lack confidence in operating ICT tools. It is also heard that this can be overcome if hands-on training is imparted.

High cost of repairing ICT devices

ICTs tools usually do not come to repair unless they are physically damaged or due to voltage fluctuations in the power supply. In the present study, the constraint high cost of repairing ICT devices was found to be ranked VIII with 49.40% of the respondents. It is found from the study that, the repairing cost of ICTs tools has gradually decreased in recent times and the repairing service centers are available in small towns also. These findings are similar to those of Sunil Rajoria *et.al* (2017)

Irregular power supply- Electricity

All the ICT tools required either a direct power supply or charging the internal battery to use it. The magnitude of this constraint was found to be very low compared to the other constraints in the present study. The probable reason may be because the recent smart gadgets are equipped with internal batteries and can be charged and can be used even

though there is no power supply. Among the total respondents, the RBQ value of this constraint was found to be 37.95% which is ranked IX. Similar findings were also recorded by Sumi and Singh (2018)

Lack of awareness of the benefits of ICTs

In a developing nation like India where ICTs tools are transforming the mode of knowledge access. The Government of India flagship initiatives like the Digital India programme with a vision to transform India into a digitally empowered society and knowledge economy, ICT-driven extension services, health care, education and e-commerce it was evident from the present study where agricultural system actors are well aware of the benefits of the tools. Among the total respondents, the RBQ value of this constraint was found to be 36.40% which is ranked X.

CONCLUSION

In the changing global perspective to make the farming society's knowledge and information vibrant, the Information and Communication Technology (ICT) tools can play a pivotal role to reach the unreached within a short period. In this regard to enhance the access to ICT tools by the farming community, many provisions have been created in the early days of the communication era. The radio, television, mobile smartphone, computer-based communication technology (email, social networking, etc), expert systems, and internet communication have been increased many folds to reach the unreached with a bouquet of agricultural scientific technology choices. The present study in such a situation investigated some of the challenges faced by the agricultural system actors in the case of accessing the ICT tools in their local areas. The prioritization of challenges in the case of accessing ICT tools exposes the crude reality of the extension system. The training and capacity building of the agricultural system actors are very much needed to access and handle the complicated ICT tools in a better way, while the process will enhance awareness and motivate people to utilize ICT tools in agricultural development to the fullest extent. The high cost of ICT tools is the second prioritized challenge in the case of accessing the ICT tools. Due to the resource poorness of the people, it is very difficult to use the ICT tools in their local situation though these facilities are available in the local market. The subsidized sale of ICT tools and networking systems may resolve the challenge in the near future. The content of the ICT tools is mostly in the English language which is not at all digestible by the educationally low-level people and it does not create any driving force to access the ICT tools. The content of the ICT tools should be made in the vernacular to create interest in the content of the ICT tools related to agriculture. Poor level of network connectivity and power supply creates a hindrance in accessing the ICT tools in a better way. The felt need is to improve the network connectivity in the remotest areas and an uninterrupted power supply is also important for enhancing the accessibility of the ICT tools in the remote areas.

Consent

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

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