

ICT: A Paradigm Shift in Promotion of Agricultural Products

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Abstract: *The usage of Information and Communication Technology (ICT) in agriculture is becoming an increasingly emerging trend in enhancing the rural development especially in enhancing agricultural production, improving markets and building as well as strengthening farmer capacities, creating enabling environments thereby bringing about a gradual change resulting in a complete make-over. In order to manage the informational and knowledge needs of the stakeholders efficiently, ICT's or systems that can deliver accurate, complete, concise information in time or on time should be applied for getting information and knowledge for making decisions and one that is client-focused, high quality, needs-driven, relevant, beneficial, one that contains actionable content, is user-friendly, interactive, credible, reliable, instant, efficient, helpful, easy to access, suitable for networking and disbursement of services that are cost-effective, well protected from unauthorized access, allows for user feedback so that the systems can respond to emerging needs and to improve the message and delivery options apart from its availability in relevant formats-language, print, softcopy have become the need of the hour. With this background, the present paper is an earnest attempt to analyze the usage of ICT's in agriculture.*

Index Terms: *Digital Divide, Indigenous farming techniques, Information asymmetry, Likert Scale.*

I. INTRODUCTION

The usage of Information and Communication Technology (ICT) in agriculture is becoming an increasingly emerging trend in enhancing the rural development especially in enhancing agricultural production, improving markets and building as well as strengthening farmer capacities, creating enabling environments thereby bringing about a gradual change resulting in a complete make-over. The informational and knowledge needs of the stakeholders vary across the different sectors of the agriculture industry namely; crop cultivation, seed and water management, crop improvement and management, abiotic and biotic stress management, pesticide application, fertigation, pest management, indigenous farming techniques, precision farming, farm mechanization, usage of agricultural engineering implements, harvesting, post-harvest handling, transporting of food/ food products, packaging, food preservation, food processing/ value addition, food quality management, organic certification, food safety, food storage, food marketing, crop insurance and bio-fuels. It is also being

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popularly used in allied fields of agriculture like sericulture, forestry, fishery and animal husbandry owing to the varied benefits that it has. In order to manage them efficiently, a system that can deliver accurate, complete, concise information in time or on time should be applied for getting information and knowledge for making decisions and one that is client-focused, high quality, needs-driven, relevant, beneficial, one that contains actionable content, is user-friendly, interactive, credible, reliable, instant, efficient, helpful, easy to access, suitable for networking and disbursement of services that are cost-effective, well protected from unauthorized access, allows for user feedback so that the systems can respond to emerging needs and to improve the message and delivery options apart from its availability in relevant formats-language, print, softcopy. Informational needs of the farmers can be classified into pre-sowing needs that involves information on agriculture inputs such as seeds and their certification, credit, early warning systems, new varieties, weather forecasting and soil testing; pre-harvest needs that include good agricultural practices, insect, pest, disease and nutrient management, harvesting and packaging techniques; post-harvest needs that includes post-harvest management, storage, grading and standardization, logistics and finally market information needs that includes alternative marketing channels, commodity and input prices, mandi information like the best time and location to market the goods and consumer trends and behaviour thereby enabling them to take informed decisions from the future perspective. The extensive amount of literature gathered from numerous sources indicates that not much of an effort has been made in the aspects pertaining to ICT's in agriculture. This paper therefore focuses on the socio-economic characteristics of the farmers using ICT's, attitude of farmers towards ICT's in Agriculture in particular and their frequency of usage of ICT's.

II. METHODOLOGY

The study was conducted in Varanasi district of Uttar Pradesh during the year 2017. A pretested and structured schedule was used to extract information from 30 farmers regarding their usage of ICT's. The schedule comprised of questions pertaining to the socio-economic characteristics of the farmers using ICT's, the attitude of farmers towards ICT's in Agriculture in particular and their frequency of usage of ICT's. Both primary and secondary sources of data have been used for the purpose of the study. The data collected was analysed using percentage analysis,

measures of central tendency and Likert Scale.

III. RESULT & DISCUSSION

The findings of the present study after analysis and tabulation have been presented below under the following headings:

SOCIO-ECONOMIC CHARACTERISTICS OF THE FARMERS USING ICT'S

Table 1 indicates the socio-economic characteristics of the farmers using ICT's. From the table, it can be inferred that small farmers with a land holding of 1-2 Ha accounted for 40 per cent followed by medium farmers (3-5Ha) occupying around 36.67 per cent. The study area indicated that only 3.33 per cent of the large farmers (>5 Ha) used ICT's in agriculture.

With respect to the number of years of farming experience, a little less than half of the farmers in the study area had 16 to 20 years of experience (40.00%) followed by farmers having 11 to 15 years of experience (30.00%). Around 13.33 per cent of the farmers have around 6 to 10 years of experience, 10 per cent of the farmers have about less than 5 years of experience and 6.67 per cent of the farmers have a farming experience ranging from 21 to 25 years. It is interesting to note that none of the farmers had an experience of 26 years and above.

Table 1: Socio-economic characteristics of the farmers using ICT's

Sl. No.	Characteristics	No. of respondents	Percentage to the total
1.	Classification of farmers		
	Marginal (<1 Ha)	6	20.00
	Small (1-2 Ha)	12	40.00
	Medium (3-5 Ha)	11	36.67
	Large (>5 Ha)	1	3.33
	Total	30	100
2.	Years of Farming Experience		
	0 to 5	3	10.00
	6 to 10	4	13.33
	11 to 15	9	30.00
	16 to 20	12	40.00
	21 to 25	2	6.67
	26 and above	0	0.00
	Total	30	100

ATTITUDE OF FARMERS TOWARDS ICT'S IN AGRICULTURE

ICT's have transformed the face and outlook of agricultural information and extension services. Agricultural development initiatives are increasingly depending on the highly effective and high impact ICT's to enrich farmers' and communities' uptake of practices, technical knowledge, know-how and innovations for improved food security apart from making them more productive, efficient, profitable and

sustainable in their precision farming activities, besides developing novel ways of optimizing production and developing quality control regulations. ICT's have proved their mettle time and again by being highly beneficial in remote and extremely backward rural areas where it is exceedingly difficult to do extensive field campaigns. Table 1 highlights the attitude of farmers towards ICT's in agriculture which has been marked against the Likert Scale with strongly agree carrying a score of 5, agree -4, neutral -3, disagree-2 and strongly disagree -1. From the table, it is evident that ICT's facilitate community based planning by providing timely information (value chains, weather changes and calamities - droughts, floods and disaster risk reduction) (4.61) was strongly agreed by majority of the farmers followed by they reduce the distance in technological gap/ "Digital Divide" (4.56), ICT's facilitate improved communication and enable problem or dispute representation at various forums, platforms etc (4.35), ICT's support farmers to move away from low-risk low-value crops towards more commercially oriented commodities (4.33) and ICT's provide access to markets and the required marketing exposure for farmers to profitably and remuneratively sell their products (4.31). Farmers indicated a neutral response for some of the statements given. However, some of the statements were opined or marked with a strongly disagree/ disagree by farmers such as ICT's bridge the gap created by social isolation in order to improve rural livelihoods (2.12).

Table 2: Attitude of farmers towards ICT's in Agriculture

Sl. No.	Statements	Mean
1.	ICT's bring about a reduction in the procurement/ sourcing transaction costs.	4.11
2.	ICT's help to improve farm-gate price realisation.	3.67
3.	ICT's enable access to improved and spontaneous scientific farming practices.	3.20
4.	They make personalised agriculture expert advice (agro-advisory services) readily available at the farmers' doorstep on a regular and continuous basis (weekly).	3.26
5.	They facilitate community based planning by providing timely information (value chains, weather changes and calamities - droughts, floods and disaster risk reduction).	4.61
6.	They bridge the gap created by social isolation in order to improve rural livelihoods.	2.12
7.	They help to double crop yields, reduce agricultural risks and earn enhanced farm incomes.	2.96
8.	ICT's help to bridge the information asymmetries that exist across the stakeholders in the value chains/ supply chains of commodities.	3.64
9.	They aid farmers to modify their crop portfolio.	3.89
10.	They support farmers to move away from low-risk low-value crops towards more commercially oriented commodities.	4.33
11.	They provide access to markets and the required marketing exposure for farmers to profitably and remuneratively sell their products.	4.31
12.	They have the ability to raise better awareness about the availability of inputs.	3.65
13.	They enable exchange of opinions, experiences, good practices and resources.	2.97
14.	They reduce the distance in technological gap/ "Digital Divide".	4.56



15.	ICT's augment the delivery of a wide range of quality financial/ banking products and services to reach a greater number of rural agricultural clients.	3.97
16.	They facilitate access to employment opportunities.	3.68
17.	They leverage agricultural outputs through technological interventions.	3.43
18.	They facilitate improved communication and enable problem or dispute representation at various forums, platforms etc	4.35
19.	They encourage the concept of online trading and e-commerce.	2.98
20.	They improve the capacity and productivity of rural agricultural activities.	3.31

IV. FREQUENCY OF USAGE OF ICT'S IN AGRICULTURE

In the context of the present study, innovative and progressive Information and Communication Technology (ICT) tools such as internet and mobile phones have remarkable potential to facilitate transfer of technologies from labs to farming community/ lands. Table 3 indicates the frequency of usage of ICT's in agriculture from which it can be inferred that all the 30 farmer respondents made use of mobiles very frequently in order to access information, followed by 24 farmers gathering information from Internet, 19 farmers preferring T.V and 18 farmers opting out for SMS. Only 3 farmers frequently made use of You Tube videos whereas only 1 farmer used video-conferencing frequently. Among the frequently used ICT's in agriculture, Newspapers and Call centers accounted for an equal number of farmers preferring (14 each) followed by E- books and Web Portals (12 each). Occasionally preferred ICT's were magazines (9) and Facebook (7) whereas rarely used ICT's included computer (7), E-books (6) and web portals (6). Farmers totaling around 26 never used video conferencing, whereas You Tube videos were never used by 21 farmers and E- mails were never used by 15 farmers. From survey reports, it is evident that 70 per cent of the Indian population resides/ dwells in rural areas out of which 56 per cent of the workforce is mainly engaged in agriculture and allied activities. The results obtained indicate that ICT tools such as Internet, mobile phones and also other technology-based systems have disseminated among the rural communities extensively.

Table 3: Frequency of usage of ICT's in agriculture

Sl. No	List of ICT's	Frequency of usage				
		Very Frequent	Frequent	Occasionally	Rarely	Never
1.	Radio	13	9	5	3	0
2.	Internet	24	4	2	0	0
3.	Mobile	30	0	0	0	0
4.	T.V	19	5	4	1	1
5.	Computer	12	8	3	7	0
6.	Facebook	10	6	7	3	4

7.	E-mail	7	2	1	5	15
8.	E-books	5	12	2	6	5
9.	Newspapers	9	14	5	2	0
10.	Magazines	6	10	9	3	2
11.	YouTube videos	3	2	4	0	21
12.	Web Portals	8	12	3	6	1
13.	Call center	12	14	2	2	0
14.	SMS	18	8	4	0	0
15.	Video Conferencing	1	1	2	0	26

V. CONCLUSION

The socio-economic characteristics of the farmers using ICT's indicates that small farmers with a land holding of 1-2 Ha accounted for 40 per cent followed by medium farmers (3-5 Ha) occupying around 36.67 per cent. With respect to the number of years of farming experience, a little less than half of the farmers in the study area had 16 to 20 years of experience (40.00%) followed by farmers having 11 to 15 years of experience (30.00%). ICT's facilitate community based planning by providing timely information (value chains, weather changes and calamities - droughts, floods and disaster risk reduction) (4.61) was strongly agreed by majority of the farmers followed by they reduce the distance in technological gap/ "Digital Divide" (4.56). The frequency of usage of ICT's in agriculture indicates that all the 30 farmer respondents made use of mobiles very frequently in order to access information, followed by 24 farmers gathering information from Internet, 19 farmers preferring T.V and 18 farmers opting out for SMS

VI. CONCLUSION AND FUTURE RESEARCH

Profitable agriculture is the only way to sustain rural India. Indian agriculture is presently facing several adversities like low yields, high rates of poverty, inconsistent quality of the produce, illiteracy and lower levels of education, poor decision making skills, extreme post-harvest losses, highly volatile prices, poor loan repayment capacity of the farmers, lack of the practice of integrated crop management, usage of contemporary farming technologies and techniques, lack of knowledge about domestic as well as international markets, missing links between lab to land, wide gap between technology generation and technology dissemination, poor ratio of extension personnel per farm family besides the rural population lacking basic communication infrastructure.

One of the major benefits of using ICT's is that the role of the middlemen can be considerably reduced in the supply chain. This can be made possible with the use of an integrated and customized ICT to help value chain and supply chain stakeholders in effective communication,



ICT's enable farmers to directly market their produce to the wholesalers without the requirement of middlemen by establishing and managing the flow of goods and services and developing better business relationships among them. It has been observed that in the absence of effective communication between the stakeholders, an unstable market scenario is created which is also due to inadequate planning. ICT's like internet can ease dialogue and up-to-date information among communities and help to share information between government planners, development agencies, researchers, and technical experts. ICT's also generate attractive and in-demand employment opportunities in different sectors thereby promoting agriculture development, progress, bettering their prospects, economic growth, augmenting the remuneration of the farming communities and hence strengthening the country's agriculture sector.

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