

Perceiving The Behavioral Change of Farmers Through Modern Information Communication Technology (ICT) Tools

K. Pradhan¹, Subhrajyoti Panda² and C. Vara Prasad³

1. Asso. Prof., 2 & 3. Ph.D. Scholar, Department of Agricultural Extension,
Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal

Corresponding author e-mail: kausikextnubkv@gmail.com

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ABSTRACT

The knowledge-intensive development plays a pivotal role in delineating the sustainable development of rural people in the country like India wherein the livelihood primarily depends on agricultural vocation through the improvement of food and nutritional security and making agriculture more market-driven to the rural people. The need of the hour is to meet the information need of the people to ensure the food and nutritional security through changing the human behavioral exposure. In such a resilient backdrop, the present study was conceptualized to assess and analyze the awareness of the farming community about ICT tools. The study was conducted in some villages of Cooch Behar district under West Bengal in India. In the present study the awareness on ICT tools was considered as predicted variable. The data were collected with the help of the structured interview schedule constructed for the study through personal interview method. The result shows that the variables education, possession of assets, management orientation, decision-making ability and utilization pattern of communication sources are positively and significantly associated with the predicted one, awareness on the use of ICT tools. On the other hand, the variables age and experience in farming are negatively and significantly associated with the awareness of the farmers about the ICT tools. The variables experience in farming and family education status are significantly and negatively and possession of assets and decision-making ability are significantly and positively contributing towards characterizing the variable, awareness on the use of ICT tools. The twenty predictor variables put together have explained 48.20 per cent variations embedded with the predicted variable awareness on the use of ICT tools.

Key words: Awareness and sensitization; Intense knowledge; Decisiveness; Sustainable farming;

In the present scenario, the information communication technology (ICTs) tools like a computer, smartphone, analog and digital tools are the key enabler and vital component of new knowledge-based economy and the information revolution. ICT driven extension services are expected to have a crucial role in facilitating the information and knowledge sharing among various actors of the knowledge generation, knowledge dissemination, input supply and knowledge consumption systems holistically. Consequently, Information and Communication Technologies could play a key role in the environmental protection, the environmental sustainability, the environmental education and the rural sustainable development (Zacharoula S. and Andreopoulou, 2012). ICT has combined the advances in agricultural

informatics, agricultural development, and agri-preneurship opportunities to provide better agricultural services, enhanced technology dissemination, and information delivery through computer-based advisory services (offline), net-based services (on-line) and mobile-based services (real-time) (Anandaraja et al., 2012).

Selwyn (2002) defined information and communication technology (ICT) as an umbrella term that includes computer hardware and software, digital broadcast and telecommunications technologies as well as digital information repositories online or offline, and includes contemporary social networking aspects, read/write interfaces on the web besides file sharing systems online. Information and Communication Technologies (ICT) in agriculture is an emerging field focusing on the

enhancement of agricultural and rural development in India. It involves the application of innovative ways to use ICT in the rural domain. The advancements in ICT can be utilized for providing accurate, timely, relevant information and services to the farmers, thereby facilitating an environment for more remunerative agriculture. In recent times, it has also been found that people are getting interest and using various ICT tools in their day-to-day life. In a study conducted by *Meera et al.*, (2011), it was revealed that 80.63 per cent farmers were having awareness about one or the other mode of information technology, while only 19.38 percent are seeking agriculture information through ICTs. He also noted the maximum awareness in the young age group with education up to middle school and land holdings between 2-4 ha. *Kabir (2015)* conducted a study on attitude and level of knowledge of farmers in the villages of Bangladesh and reported that farmers of the study areas have a moderately favorable attitude and the most important finding is that there are no farmers in the study areas who less or slightly favorable attitude towards ICT based farming.

Singh et al. (2015) observed that few constraints mKRISHI® showed promising option for the dissemination of information among farmers and extension workers due to its unique technology adopted for dissemination of information. So it could be replicated in other parts of country also to disseminate the agricultural technologies and information to the vast numbers of small and marginal farmers in the country. *Tata and McNamara (2016)* found that agricultural extension experts and institutions around the world were promoting the use of Information and Communication Technology (ICT) by agricultural extension and education agents. *Mittal and Meher (2012)* reported that increasing mobile phone and mobile phone based services enhanced the availability to knowledge and information and will further helped in improving awareness, education, better adoption of technology, better health and efficiency, reduced transaction costs, better market efficiencies, etc. in countries like India and other South Asian and African countries. *Syiem and Raj (2015)* revealed that the level of availability and accessibility of ICTs was the highest for mobile phones followed by television and radio respectively because the mobile phones was highly accessed and most frequently used by majority of the respondents

that it was easily affordable and could be easily used by even illiterate farmers. *Talebianb Sogole et al. (2014)* reported that people had to access knowledge via information and communication technology (ICT) to keep pace with the latest developments. By applying ICT, the possibility of learning without constraints of time and place would be achieved which suit the needs of the students. *Gelb et al.*, (2005) reported that connectivity was the constraint for low use of ICTs especially among extension workers and farmers was the differing levels of consensus among these actors. *Kumar Ganesh (2008)* in his study found that majority (66.67%) of the extension service providers had favourable attitude towards ICT based extension followed by more favourable (18.33%) and less favourable (15.00%) attitude towards ICT based extension. *Gunawardana and Sharma (2007)* conducted a study on information seeking behaviour of tribal and non-tribal farmers in Udaipur district of Rajasthan. *Ajayiet al. (2013)* recommended that adequate information on various relevant ICT suitable for extension service delivery should be given to extension agents so that they could improve their knowledge on it and also help them to develop more positive perception that will enhance the future use of these ICT in extension service delivery. *Devraj and Chaturvedi (2003)* reported that the latest advances in infor.technology, computers, telecommunication and internet had provided conducive environment for adopting new technologies and making the method of instruction more effective and interactive. *Alex et al. (2004)* mentioned that internet, ICT kiosks, ICT-equipped intermediary organizations and mobile phones were expected to play an important role in strengthening the more complex and time-urgent pathways of information and knowledge-sharing on which agricultural innovations depend. *Parikh et al. (2008)* conducted study on ICT tool to reach the unreached. e-learning was studied with objectives i: e improved employment prospects, helped people escape from poverty and overcame the wastage of potential talent. *Balaji et al.*, (2007) observed that the use of ICTs - radio, television and mobile phones in particular, could accelerate agricultural development by improving access to information and knowledge services.

Under such a research niche, the present study was carried out with the aim of assessing the perceived

behavioral change of the farmers by generating awareness about ICT tools and thereby exploring the important attributes associated with the farmers which have a significant influence on their awareness about ICT tools.

METHODOLOGY

The study was conducted in five villages of Cooch Behar-I and Cooch Behar-II block of Cooch Behar district of West Bengal. Purposive as well as multistage sampling and random sampling procedures were followed in selecting the respondents. An exhaustive list of ICT tool users for agricultural extension services was prepared with the help of the local people, local administrators etc. From the exhaustive list twenty (20) number of ICT tool users were randomly selected as respondents from each selected villages. Accordingly, the total number of respondents was hundred (100). Awareness is the knowledge provoking approach of human psychology. Here awareness on ICT tools means farmers response towards ICT tools regarding their knowledge endowment related to use of ICT tools for seeking information related to agriculture. This is operationalized and measured with the help of the modified scale constructed by *Khondokar Humayun Kabir (2015)*.

RESULTS AND DISCUSSION

On the basis of the proposed research study, the behavioral change of the farmers through awareness generation on ICT tools operationalized and measured

in three distinct dimensions namely the knowledge, skill, and attitude. Knowledge emphasizes the cognitive pursuit of a human being, skill explains conative element of the human psyche that may be associate with the ability of performing a job in a meaningful way and attitude reflects the predisposition of behavioural expressions. In the present study the change in these three dimensions ultimately clarifies the change in entire behaviour of human being.

Chart 1 . Change in knowledge, skill, and attitude of farmers' : Chart-1 presents the change in knowledge, skill, and attitude of farmers in terms of the scientific cultivation practices, modern ICT tools access and Market led agriculture which is mostly dependent on the latest information received from ICT tools. The awareness-generation activity on ICT tools paves the way of changing knowledge about the scientific cultivation practices, modern ICT tools access and market led agriculture.

Change in Knowledge: It is observed that majority of the respondents have shown a considerable change in knowledge related to the scientific cultivation of practices and modern technology access of which 42 per cent and 58 per cent shown more change and 44 per cent and 31 per cent shown less change respectively. But in market-led agriculture there was 55 per cent of respondents shown less change in knowledge and 25 per cent shown more change

Change in skill: In terms of scientific cultivation practices, modern ICT technology access and market-

■ Scientific Cultivation Practices ■ Modern ICT Tools Access ■ Market led Agriculture

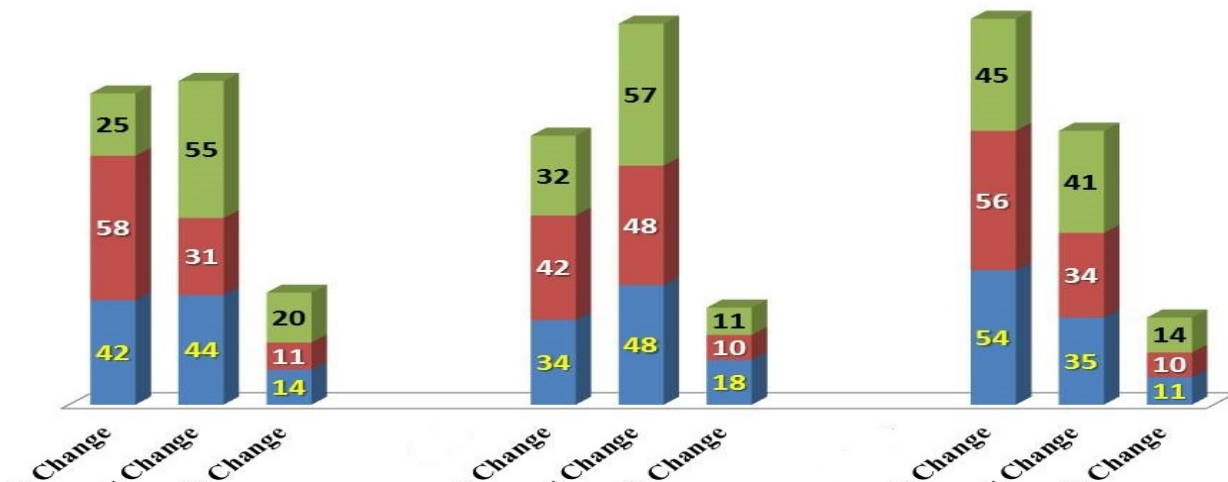


Chart 1 . Change in knowledge, skill, and attitude of farmers'

led agriculture. It is observed that nearly half of the respondents show less change in skill in scientific cultivation practices i.e. 48 per cent and modern ICT technology access i.e. 48 per cent respectively. But in case of market-led agriculture 57 per cent of respondents have shown less change in skill in market-led agriculture and 32 per cent more change.

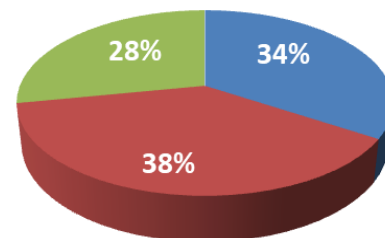
Change in attitude : The respondents in terms of scientific cultivation practices, modern ICT technology access, and market-led agriculture. It is observed that number of respondents that is 54 per cent and 56 per cent have shown more change in attitude towards scientific cultivation practices and modern ICT technology access. In market-led agriculture only 45 per cent of respondents have shown more change in attitude.

From the above tables it was observed that in case of scientific cultivation practices 42 per cent, 34 per cent and 54 per cent of farmers have shown high level of change in terms of knowledge, skill, and attitude but 44 per cent, 48 per cent and 35 per cent farmers shown a little change in terms of the knowledge, skill and attitude due to awareness building avenues on modern ICT tools. They believe that ICT tools can provide adequate information about scientific cultivation practices which improve their knowledge and attitude. But in case of skill, since they require direct demonstration in the field, only 34 per cent farmers have shown little change regarding the skill. In case of usability of modern ICT tools, the majority of the farmers have shown more interest in using the latest ICT tools i.e. 58 per cent, 42 per cent, 56 per cent in case of changing the knowledge, skill, and attitude respectively. As most of the farmers are young and using a smart phone, so they can easily access the internet and get information after the awareness. In case of market-led agriculture, the farmers have shown a little change in knowledge and skill due to the awareness generation activities on ICT tools. Their attitudinal change related to market-led agriculture is praiseworthy (48% positive change) during the period of awareness generation activities on ICT tools.

Chart: 2 present the distribution of the farmers according to their awareness of ICT tools. The results show that majority of the respondents have a medium level of awareness on ICT tools with a score of 33.67-46.33 (41%) followed by a low level of awareness on ICT tools with score 21-33.66 (34%) and high level of awareness on ICT tools with score 46.34-59 (25%)

Chart 2: Distribution of respondents according to their awareness on Information Communication Technology (ICT) (Y)

■ Low 55-64.66 ■ Medium 64.67-74.33 ■ High 74.34-84



Mean: 39, SD: 9.26, CV: 23.73

respectively. The mean score of total distribution is 39 and the standard deviation is 9.26. The coefficient of variation value within the distribution being 23.73 per cent signifies very high consistency level of the distribution of the variable ‘awareness on ICT tools’. It is revealing the fact that most of the farmers in the study area have a medium level of awareness on ICT tools and initiatives could be taken for enhancing their awareness on ICT enabled extension services to the maximum extent possible.

Table 1 reflects the Pearson’s coefficient of correlation among the dependent variable, awareness on ICT tools of the farmers with the twenty causal variables. The result shows that the variables education (X_4), possession of an asset (X_{16}), management orientation (X_{17}), decision-making ability (X_{18}) and Utilization pattern of communication sources (X_{20}) are positively and significantly associated with the dependent variable, awareness on ICT tools. On the other hand, the variables age (X_1) and experience in farming (X_3) are negatively and significantly associated with the awareness of the farmers about the ICT tools.

Age and awareness of ICT tools : In all societies, age plays an important role in case of motivating people towards adopting new technologies. It is usually found that with an increase in the age, people become less interested and less enthusiastic to use latest technologies. In the present study, it is found that the young aged farmers are more interested to gather information with the help of various ICT enabled extension services to improve their farming practices; their exposure to mass media and other information sources is higher than the old aged people. Therefore, the younger section of the

farming community become more aware of ICT tools which are applicable to agriculture than the elder ones. This may be the plausible reason behind the negative and significant association between the variables age and awareness on ICT tools.

Table 1. Correlation Coefficient of awareness on ICT tools (Y) of respondents with 20 independent variables

Variables	(r)
Age(X_1)	-0.316**
Caste(X_2)	0.167
Experience in farming (X_3)	-0.439**
Educational Qualification(X_4)	0.211*
Family Education Status(X_5)	0.186
Family Annual Income (X_6)	0.196
Family Annual Expenditure(X_7)	0.152
Land Holding (X_8)	-0.031
Possession of assets(X_9)	0.372**
Livestock possession(X_{10})	-0.083
House Type (X_{11})	0.03
Social Participation(X_{12})	0.17
Self Confidence (X_{13})	-0.115
Risk Preference (X_{14})	0.044
Scientific Orientation (X_{15})	0.066
Economic Motivation (X_{16})	0.178
Management Orientation(X_{17})	0.257**
Decision-making ability(X_{18})	0.216*
Achievement Motivation (X_{19})	0.008
Utilization pattern of communication sources(X_{20})	0.244*

** Significant at 1% level *Significant at 5% level

Experience in farming and awareness of ICT tools: Experience enables an individual to expose himself to a variety of situations which, in turn, develops in him a strong insight into pros and cons of a particular situation. Therefore, people with limited experience in any particular topic need to consult with other experienced persons or institutions for getting appropriate knowledge about that topic. In the present study, the farmers who are cultivating their lands from recent times are found to be more interested in ICT based extension services than those cultivating long. The probable reason behind that may be the lesser experience of the farmers which compels them to consult various ICT tools for applying latest agricultural technologies in their field. On the other hand, the experienced farmers are less interested for ICTs. That is why the variable experience in farming is significantly and negatively associated with the dependent variable, the awareness of ICT tools.

Education and awareness of ICT tools : Education is

the backbone of cognitive enlargement. Persons acquire their knowledge from the formal education system and develops in them inquisitiveness about new things. Educated persons seek information from the different cosmopolite sources to update their knowledge. Similarly, the farmers with higher educational qualification are more prone to get access to the ICT tools related to agriculture. Through their educational exposure, they can also consult with various technical persons of ICTs and thereby know more about the latest development of ICTs. In this way, education stimulates their interest in ICT based extension services for developing their farming practices in a sustainable way. That is why the variable education is significantly and positively associated with the dependent variable, the awareness of ICT tools.

Management orientation and awareness of ICT tools: Management orientation is conceptualized as the orientation of an individual in case of planning, managing the whole process and marketing of the agricultural products. It considers the decision related to actions to be conducted, starting from the contingency planning, the application of the scientific practices in a better way to managing the situation and sending the product to market. In the study area, the farmers are more advanced to take any new technology and they are more aware towards ICT tools for their information needs. The farmers are selling their product in the nearest market without knowing the price of the product in the other areas, but they want to sell their product at a profitable price. In that direction, ICT would be an effective tool for them to get remunerative price for their product. They also believe that managing the agricultural practices through modern technologies and using information sources like mobile, computer would help them in increasing production and profit. This is the plausible reason why the variable management orientation is significantly and positively correlated with awareness on ICT tools.

Decision-making ability and awareness of ICT tools: Decision-making is regarded as the cognitive process resulting in the selection of a belief or a course of action among several alternative possibilities. Every decision-making process produces a final choice; it may or may not prompt action. Decision-making is the process of identifying and choosing alternatives based on the values and preferences of the decision-maker. In the present study the farmers of the study area with more decision-

making ability have developed greater awareness on ICT tools as they are capable of taking their own decision in attending agricultural training and adopting modern technologies. This is the reason that most of the farmers with sound decision-making ability are aware of ICT tools. That is why the variable decision-making ability is significant and positively correlated with awareness of ICT tools.

Utilization pattern of communication sources and awareness on ICT tools : Communication sources mainly influence the farmers to improve their behaviour towards the information need which helps them in solving various problems related to farm and home. Table 2 reflects the multiple regression analysis of awareness on ICT tools with the 20 predictor variables. From the table, it is observable that the variables experience in farming and family education status is significantly and negatively contributing towards characterizing the dependent variable awareness on ICT tools. Other variables like possession of assets and decision-making ability are significant and positively contributing towards characterizing the dependent variable awareness on ICT tools.

Experience in farming and awareness of ICT tools: Experience in farming is the time period that how many years a farmer doing his work in agriculture and other

allied activities. In the present study main focus has been on the young aged farmers. Nowadays the young age farmers are not interested towards agriculture or they have very less knowledge about agriculture. They are more educated than the old aged farmers who have more experience in farming. The younger generation are very much aware about ICT tools as they are much more exposed to mass media. But the farmers having more experience in farming are not so educated and they do not give so much importance towards ICT tools. The more experienced farmer is skilful enough in handling farm activities but they are not so much interested or trained to use ICT tools. This may be the plausible reason that the variable experience in farming is negatively and significantly contributing towards characterizing the predicted variable awareness on ICT tools. The variable experience in farming is directly contributing 37.10 per cent in case of characterizing awareness on ICT tools. One unit change of the variable family education status is delineating the 0.460 unit change in the predicted variable awareness on ICT tool.

Family education status and awareness of ICT tools: Family education status indicates the formal education of the family members which makes them more critical and analytical towards the awareness of ICT tools. In

Table 2. Multiple regression analysis of Awareness on ICT tools (Y₁) of respondents with 20 predictor variables

Variables	Standardized regression coefficient (β)	Unstandardised regression coefficient (β)	S.E of (β)	t-value
Age(X ₁)	-0.051	-0.049	0.159	-0.308
Caste(X ₂)	0.075	1.082	1.257	0.861
Experience in farming (X ₃)	-0.371	-0.460	0.209	-2.193*
Educational Qualification(X ₄)	0.073	0.815	1.059	0.770
Family Education Status(X ₅)	-0.208	-0.727	0.313	-2.32*
Family Annual Income (X ₆)	0.084	1.610	4.417	0.364
Family Annual Expenditure(X ₇)	0.025	0.590	5.413	0.109
Land Holding (X ₈)	0.040	0.196	0.592	0.330
Possession of assets(X ₉)	0.232	0.186	0.087	2.147*
Livestock possession(X ₁₀)	-0.012	-0.020	0.157	-0.131
House Type (X ₁₁)	0.004	0.059	1.344	0.044
Social Participation(X ₁₂)	0.098	2.219	2.154	1.030
Self Confidence (X ₁₃)	-0.008	-0.029	0.320	-0.092
Risk Preference (X ₁₄)	-0.130	-0.779	0.544	-1.430
Scientific Orientation (X ₁₅)	-0.086	-0.383	0.412	-0.929
Economic Motivation (X ₁₆)	0.084	0.481	0.562	0.855
Management Orientation(X ₁₇)	0.148	0.331	0.203	1.629
Decision making ability(X ₁₈)	0.193	1.393	0.672	2.07*
Achievement Motivation (X ₁₉)	-0.022	-0.111	0.445	-0.249
Utilization pattern of communication sources(X ₂₀)	0.116	0.253	0.210	1.203

** Significant 1% level* Significant at 5% levelR²= 0.482

the present context, the farmers' family have a low level of education due to the lack of information and awareness about the education. The high level of family education status compels the farmer to think upon the matter about the ICT tools which are very helpful to get appropriate information. In the study area, most of the members of the farm family have studied up to primary level. They are not so much exposed to the modern information technological world. As their family education status is less, so the farmers are not so concerned about ICT tools. That is why the variable "family education status" is negatively and significantly contributing towards characterizing awareness on ICT tools. The variable family education status is directly contributing 20.08 per cent in case of characterizing awareness on ICT tools. One unit change of the variable family education status is delineating the 0.727 unit change in the predicted variable awareness on ICT tool.

Possession of assets and awareness on ICT tool: In rural areas, the farm family having a number of assets like tractor, television, mobile, etc. are believed to be the most successful and profitable farmer. In the present study, it has been observed that most of the farmers have given more importance to adopt new technologies and mechanised instruments for their farming. Most of the farmers are young aged. So, they are interested to use mechanized instruments to do their farming efficiently and to get more profit from less investment. For this reason most of the families having medium level of assets possession would like to become aware about ICT tools to take any new initiatives in farming. This may be the plausible reason that the variable 'possession of assets' is significantly and positively contributing towards characterizing the predicted variable awareness on ICT tools. The variable possession of assets is directly contributing 23.20 per cent towards characterizing awareness on ICT tools. One unit change of the variable is delineating 0.186 unit change in the predicted variable awareness on ICT tools.

Decision-making ability and awareness on ICT tool: Decision-making ability is directly associated with the knowledge endowment. The skillful manipulation of knowledge generates wisdom and that wisdom helps in developing acumen in taking decisions for coping with the unprecedented problem. This ability requires handful knowledge in case of a particular issue so that an individual can prepare the strategy to solve that challenge in a better way. For the development of knowledge, there is a need for up to date information regarding the

challenge to be addressed information is the pillar of generating knowledge and acumen to decide upon a strategy. In the present study area, The ICT tool can play a pivotal role in case of enhancing the information availability and its accessibility. The people who are aware of the ICT tools which are the store house of information can create an environment for accessing the information at their doorstep which helps in generating knowledge for taking appropriate decision in favor of the accurate strategy to overcome challenges. That is why the variable 'decision-making ability' is significantly and positively characterizing the predicted variable 'awareness on ICT tool'. The variable decision-making ability is directly contributing 19.30 per cent towards characterizing awareness on ICT tools. One unit change of the variable is delineating 1.393 unit changes in the predicted variable awareness on ICT tools.

The R^2 value being 0.482, it is to infer that the twenty predictor variables put together have explained 48.20 per cent variation embedded with the predicted variable awareness on ICT tools used by the respondents. Still, 51.80 per cent variation embedded with predicted one remains unexplained.

CONCLUSION

In the present context, the information bestowed agriculture is making the society more knowledge vibrant. The use of information technology tools paves the way to develop more knowledge and information intensive agriculture. The awareness generation on the application of latest ICT tools also helps in delineating the agricultural development as a whole. The use of computer and smartphone has a greater impact on the psyche of the farmers to establish a greater change in their behavioral complex comprising of knowledge, skill and attitude. Present study also reflects that the awareness generation activities on ICT tools changes the knowledge, skill and attitude or the behavior complex of the farmers in a larger extent in case of promoting scientific agricultural practices, accessing the modern ICT tools for agricultural information and dealing with market-led agriculture. Similarly rural farmers can improve their farming practices with the help of modern ICT enabled extension services. The concept and utilization of ICT enabled extension services depend primarily on awareness of ICT tools for seeking the agricultural related information from the source and utilizing the same in the local level *toto*. To promote

agriculture with ICT enabled extension services, the stakeholders should be selected on the basis of their age, education, interest, economic status, social belongingness, awareness and access. The young aged people are much more responsive towards modern ICT

enabled extension services and they have the skill to access information and utilize that information in their home or farm. Education is also playing a crucial role for acquiring experience and knowledge to utilize ICT enabled extension services in the local level.

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