

**A Study on E-Readiness of Extension Personnel
in Agricultural Institutions in Ri-Bhoi District Of
Meghalaya**

Thesis

Submitted to the
Central Agricultural University, Imphal
in partial fulfillment of the requirements
for the award of the degree of

Master of Science (Agriculture)

In

Agricultural Extension

by

NIKHIL J, B.Sc. (Agri.)

I-17-ML-01-010-M-A-022



**SCHOOL OF SOCIAL SCIENCES
COLLEGE OF POST GRADUATE STUDIES
IN AGRICULTURAL SCIENCES
CENTRAL AGRICULTURAL UNIVERSITY, IMPHAL**

Umiam, Pin: 793103, Meghalaya, India

August 2019

*DEDICATED
TO MY
PARENTS
JGADEESHWARA
REDDY S. AND
BHAGYAMMA G.Y.*



CERTIFICATE- I

Certified that **Mr. Nikhil J**, (Admission No. **CAU/CPGS/AGEXT/M-17/02**; Registration No. **I-17-ML-01-010-M-A-022**) has satisfactorily prosecuted his course of research for a period of not less than two semesters and that the thesis entitled “**A Study on E-Readiness of Extension Personnel in Agricultural Institutions in Ri-Bhoi District of Meghalaya**” submitted by him to the Central Agricultural University, Imphal - 795 004 (Manipur) in partial fulfillment of the requirement for the award of the degree of **Master of Science (Agriculture)** in the subject of **Agricultural Extension** is the result of original research work conducted by him under my supervision and is sufficiently of high standard to warrant its presentation to the examination.

I also certify that the thesis or part thereof has not been previously submitted by him for a degree of any University.

Date:

(J. K. Chauhan)

Chairperson

Student's Advisory Committee



CERTIFICATE- II

This is to certify that the thesis entitled “**A Study on E-Readiness of Extension Personnel in Agricultural Institutions in Ri-Bhoi District Of Meghalaya**” submitted by **Mr. Nikhil J. [Regn. No. I-17-ML-01-010-M-A-022]** submitted to the Central Agricultural University, Imphal- 795 004 (Manipur) in partial fulfillment of the requirement for the award of the degree of **Master of Science (Agriculture)** in the subject of **Agricultural Extension** has been approved by the Student’s Advisory Committee after oral examination jointly with a Dean’s Nominee.

(P. K. Bora)

Professor
School of Natural Resource Management
Dean’s Nominee

(J. K. Chauhan)

Professor,
School of Social Sciences
Chairperson,
Student’s Advisory Committee

In-Charge,
School of Social Sciences

Dean of Faculty

(R. J. Singh)

Assistant Professor,
School of Social Sciences
Member,
Student’s Advisory Committee

(Binodini Sethi)

Associate Professor,
School of Social Sciences
Member,
Student’s Advisory Committee

(L. Hemochandra)

Associate Professor,
School of Social Sciences
Member,
Student’s Advisory Committee

Date:

DECLARATION

I, hereby declare that the thesis entitled “**A STUDY ON E-READINESS OF EXTENSION PERSONNEL IN AGRICULTURAL INSTITUTIONS IN RI-BHOI DISTRICT OF MEGHALAYA**” is an authentic record of the work done by me and that no part thereof has been presented for the award of any other degree, diploma, associateship, fellowship or any other similar title.

Date:

Place: Umiam, Meghalaya

(Nikhil J.)

Student

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Place:

Date:

(NIKHIL J.)

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LIST OF ABBREVIATIONS

%	Percentage
etc.	Et cetera
per cent	Percentage
Viz.,	Like wise
AAO	Assistant Agriculture Officer
ADO	Assistant Director of Agriculture
AO	Agriculture Officer
ATMA	Agricultural Technology Management Agency
BAO	Block Agriculture Officer
CAU	Central Agricultural University
COA	College of Agriculture
CPGSAS	College of Post Graduate in Agricultural Sciences
DAO	District Agriculture Office
GPS	Global Positioning System
ICAR	Indian Council of Agricultural Research
ICTs	Information and communication Technologies
KMA	Kisan Mobile Advisory
KVK	Krishi Vigyan Kendra
LCD	Liquid Crystal Display
LMS	Learning Management System
M.Sc.	Master of Science

MSDA	Maharashtra State Department of Agriculture
NEHR	North Eastern Hill Region
Ph.D.	Doctor of Philosophy
PIICT	Perceived importance of information and communication technology tools
PQICT	Perceived quality of information and communication technology tools
RC	Research Complex
RKMP	Rice Knowledge Management Portal
RRTC	Rural Resource and Training Centre
RSK	Raitha Samparka Kendra
SIRD	State Institute for Rural Development
SMS	Subject Matter Specialist

Abstract

Meghalaya is one among the North-Eastern States of India that is having major occupation as agriculture. The Indian agriculture has shown a tremendous and decreasing trend of growth rate in a national perspective. The reason being not that there is dearth of research but lack of knowledge among the farming community about the advanced and latest technologies. In the context of climate change, agriculture is highly vulnerable and there is a need to develop strategies and coping mechanisms. The main role to bring this change bestows of the extension personnel, who are mainly embodied with the task and responsibility of transfer of technology, change in knowledge, attitude and belief and effective diffusion and adoption of improved technologies (Chavai *et al.*, 2017). The ICTs (Information and Communication Technologies) play a significant role in bridging gap between extension personnel and farmers. Hence the study aimed to study the e-readiness of extension personnel in various agricultural institutions in the Ri-Bhoi district. Descriptive research design was adopted for the study. The investigation was done in Ri-Bhoi district of Meghalaya state. Sixty extension personnel in eight institutions including ICAR RC NEH Region, KVK and State Government line departments were selected. Interview schedule was developed to collect the data. The collected data from the officers of these agricultural institutions were scored, tabulated and analyzed using frequency, percentage, mean, standard deviation, class interval and Pearson correlation coefficient. More than three fourth (81.67%) of the respondents belonged to the middle age (32-48 years) group and 65 per cent of them were male respondents. Little above half (53.34%) of the respondents possessed doctorate degree followed by 28.33 per cent with post-graduation. Majority (70.00%) of respondents had medium job experience with a range of 4-19 years while 41.67 per cent of the respondents' major job responsibility was teaching. More than half (68.33%) of the respondents had medium level of achievement motivation, 58.33 per cent of them had medium level of innovativeness while 86.67 per cent of the respondents opined that their job performance was medium. All the respondents possessed mobile phones of which 98.33 per cent had smart phones with internet connection. 93.33 per cent of the respondents had a personal laptop/computer of which 90 per cent of them had internet connection. Only 33.33 per cent were undergone trainings in ICTs while 66.67 per cent had not undergone training in ICTs. From the findings it could be seen that majority of the respondents confirmed that their workplace (office/institution) was their major source of information regarding awareness about ICTs, followed by friends. The attitude of the respondents towards ICTs revealed that 88.33 per cent of them had favourable attitude while 1.67 per cent had highly favourable attitude. Three fifth (60.00%) of the respondents had high access to ICTs of which all of them expressed that the purpose of accessing ICTs was mainly for gaining knowledge, 91.67 per cent for storing information, 90 per cent for networking, 81.67 per cent to process and analyse data and 73.34 per cent for sharing information. Findings revealed that most of the ICT tools were used primarily for awareness and transfer of technology. Majority (76.67%) of the respondents had medium level of e-readiness, while 15 per cent had high level of e-readiness. Respondents opined that no assured power supply (33.33%) and lack of availability of advanced softwares (26.67%) as their major problems faced during ICTs.

Key words: e-readiness, attitude, extension personnel, ICTs

Chapter 1

Introduction

1.1 Indian agricultural extension system- An overview

The Indian agriculture has shown a tremendous and decreasing trend of growth rate in a national perspective. The reason being not that there is dearth of research but lack of knowledge among the farming community about the advanced and latest technologies. In the context of climate change, agriculture is highly vulnerable and there is a need to develop strategies and coping mechanisms. The main role to bring this change bestows on the extension personnel, who are mainly embodied with the task and responsibility of transfer of technology, change in knowledge, attitude and belief and effective diffusion and adoption of improved technologies (Chavai *et al.*, 2017). The earlier role of extension studies was a traditional approach emphasizing on face-to-face, personnel contact method of information and technology dissemination. Since information is an indispensable resource wherein information at right time at right place to right person is *sine-qua-non* for effective and efficient farming decision by a farmer, there is always a felt need to use the Information and Communication Technologies (ICTs). The farmers may not be so proficient in using ICTs by themselves but the extension personnel should have the full potential to utilize these ICTs for effective transfer of technologies. Agricultural extension functionaries in India have an important role in dissemination of agricultural technologies to enhance the productivity of the farming community. But to implement e-extension initiatives into effectual function, an extension officer must be e-ready to adopt new initiatives for quicker dissemination (Lakshmi *et al.*, 2018). The study here aims on measuring the e-readiness of the extension personnel. E-Readiness refers to a state of preparedness to participate in the digital economy. The state of maturity is commonly measured by the country's ICTs' infrastructure and the ability of its government and citizens to utilize the positive impacts of ICTs for sustainable development (Kumar and Gupta, 2017).

Meghalaya is one among the North-Eastern States of India that is having major occupation as agriculture. The state is bestowed with vast bio-diversity and rich natural resources base. The farmers of Meghalaya are mostly the tribes following traditional agriculture as jhum cultivation. The important crops in the state are rice, potato, ginger, turmeric etc. The State is having many public and private institutions

working for the betterment of the agrarian community. Most of the institutions are based in Ri-Bhoi district. The agricultural institutions in Ri-Bhoi district are District Agriculture Office, Krishi Vigyan Kendra, Agricultural Technology Management Agency, Rural Resource and Training Centre, State Institute for Rural Development, ICAR for NEH region, College of Post Graduate Studies, Umiam and College of Agriculture, Kyrdemkulai under Central Agricultural University, Imphal, [CAU (Imphal)], Manipur. All the institutes have a common mandate as to improve the socio-economic condition of the farmers. To achieve this, there is an imperative need to measure and assess the level of e-readiness among the extension personnel involved in various institutions for farming. Hence the following study, aims to study the level of e-readiness of the extension personnel of different institutions and draw meaningful comparisons between them for suitable suggestions for further improvement.

1.2 Statement of problem

The study aims to understand the technical competence of the extension personnel in terms of use of ICTs for fostering effective and efficient information exchange and transfer of technologies to the end users. In such a situation it is imperative to first understand the level of e-readiness of the extension service providers and provide suitable trainings to improve their skills for effectively harnessing the benefits of the ICT based projects implemented in the state.

1.3 Objectives

1. To understand the accessibility and utility pattern of ICT tools by the extension personnel in agricultural institutions.
2. To measure the level of e-readiness of the extension personnel in agricultural institutions.

1.4 Scope of the study

The present study on e-readiness emphasizes on giving a closer view on the variables influencing e-readiness and aids to understand e-readiness components used in the study. The study helps in analysing the attitude of the extension personnel in the agricultural institutions towards ICTs. The study also helps in assessing various sources of awareness about ICTs, to study the access to ICTs and utility pattern of ICTs by the extension personnel and also to find out the problems faced by the extension personnel in using ICTs. The present study helps organisations that are providing extension service to farmers to know attitude, accessibility, and utility of ICTs by extension personnel and would assist organizations to fix the problems

faced by the extension personnel which would enhance the performance of extension personnel.

1.5 Limitations of the study

The time and resources are limited to certain extent for the student researcher. ICTs are highly dynamic which would change in a short period of time, making the findings of the present study obsolete. Since the study was conducted in only one district, the generalizations made based on the study may not hold good for the whole State, and may not represent the present scenario and since different institutions were selected in the study, certain generalizations may not be necessarily applicable to all organizations. The researcher had taken greatest possible care while collecting the data, analysing the data and interpretation, still there might exist some error(s) while interpreting the data. Irrespective of the limitations sincere and honest efforts were put forth by the researcher to conduct an objective research.

1.6 Presentation of thesis

The present study was properly organized and presented in 5 chapters as given below.

Chapter 1: Introduction

This chapter includes introduction to the topic, statement of problem, objectives, scope and limitations of the study.

Chapter 2: Review of literature

This chapter contains brief reviews of literature available which are in line with the present study.

Chapter 3: Methodology

This chapter accommodates study area, sampling plan, all the variables in the study and their respective measurement tools. It also includes statistical tools used to interpret the study.

Chapter 4: Results and discussion

This chapter deals with the all the results obtained in the study and detailed discussion of the obtained results.

Chapter 5: Summary and conclusion

This chapter summarizes all the above chapters briefly along with conclusion and suggestions made based on the study.

Chapter 2

Review of Literature

In order to develop a proper understanding of the research problem and to develop a conceptual framework to conduct the study, it is very essential on the part of the researcher to review the efforts made by the earlier researchers. A systematic review of the past literature helps the researcher to have a mental framework of their research, provides comprehensive information on methods, procedures and forms the basis for interpretation of findings. It guides the researcher throughout the investigation period. The literature viewed for the purpose of study is organized and presented under the following headings:

- 2.1. Personal and psychological characteristics of extension personnel
- 2.2. Variables related to ICTs
- 2.3. Attitude towards the use of ICTs
- 2.4. Access to ICTs
- 2.5. Utilization of ICTs
- 2.6. Purpose of accessing ICTs
- 2.7. E-Readiness
- 2.8. Problems faced during usage of ICTs

2.1 Personal and psychological characteristics of extension personnel

2.1.1 Age

Nagalaksmi (2008) in her study on integrating ICT with multiple functions for agriculture development observed that 52.94 per cent of extension personnel belonged to old age category.

Shankaraiah and Swamy (2012) in their study on attitude of farmers and scientist towards dissemination of technologies through mobile message service reported that 52.50 per cent of the farmers belonged to middle age category, 35.00 per cent to old age and only 12.50 per cent of the farmers fall under young age category.

Ganeshan *et al.* (2013) in their study use of mobile multimedia agricultural advisory systems by Indian farmers: Results of a survey had found that majority of the farmers (46.00%) using mobile multimedia advisory systems for agriculture belonged to middle age group (36-45 years).

Raksha *et al.* (2015 b) in their study on e-readiness of agricultural extension personnel with the use of ICTs in agricultural extension systems noticed that 51.67 per cent of the respondents are young (30-34 years) and 28.33 per cent of respondents belonged to middle age group (35 - 39 years).

Chavai *et al.* (2017) in their study on utility pattern of ICT tools for transfer of agricultural technology by the extension personnel concluded that 60 per cent of the respondents are aged between 36 and 46 years.

2.1.2 Gender

Agwu *et al.* (2008) in their study on use of information communication technologies (ICTs) among researchers, extension workers and farmers in Abia and Enugu States found majority (70.00%) of the extension workers were male.

Raksha (2014) in her study on information and communication technologies in agricultural extension system in Andhra Pradesh observed that 64.44 per cent of respondents were male and 35.56 per cent were female.

Lakshmi *et al.* (2018) in their study on assessment of e-readiness of extension functionaries of Southern States of India in agricultural technology dissemination reported that 87.40 per cent of the respondents were male followed by female (12.60%).

2.1.3 Educational qualification

Hedjazi *et al.* (2006) in their study on factors affecting the use of ICTs by Iranian agriculture extension specialists, reported that only 3.80 per cent of the respondents had a Ph.D. degree, whereas 34.60 per cent of them had Master's degree and more than half of them (61.50%) had a Bachelor's degree.

Salau and Saingbe (2008) reported that majority (71.10%) of the researchers had post graduate degrees, while 51.11 per cent of the extension workers had National Diploma as their highest qualifications.

Nagalakshmi and Narayanaswamy (2009) revealed that extension personnel working in Raitha Samparka Kendras (RSK) had education starting from matriculation to M.Sc. (Agri).

Meera *et al.* (2010) conducted a study on critical analysis of e-learning opportunities and e-readiness in the public extension system: Empirical evidence from Tamil Nadu, and reported that majority (63.00%) of the respondents had a Master's degree in agriculture as their educational qualification.

Rai (2014) in his study on e-readiness of Krishi Vigyan Kendra (KVK) functionaries in Uttar Pradesh revealed that majority (73.51%) of respondents had doctorate degree and the remaining 26.49 per cent were post graduates.

Alabi (2016) in his study on adoption of information and communication technologies (ICTs) by agricultural science and extension teachers in Abuja, Nigeria, observed that a majority (60.00%) of the respondents were having Ph.D. qualification, whereas 31.67 per cent had Master's degree and only 1.66 per cent of the respondents had undergraduate degree.

2.1.5 Job Experience

Sunil *et al.* (2009) reported that more than half (59.60%) of the change agents possessed service experience of more than 25 years, 25.60 per cent of the respondents possessed service experience between 16 to 25 years and the remaining 14.80 per cent of the respondents possessed less than 16 years of service experience.

Mishra (2010) reported that a good number of extension trainers (42.60%) had experience of 10 to 25 years, followed by 41.73 per cent had less than 10 years of experience and the remaining 15.65 per cent of the respondents had more than 25 years of work experience.

Hashemi *et al.* (2014) observed that 41.20 per cent of extension workers were having experience of 5 years and less, followed by 37.40 and 21.40 per cent having experience of 6-15 years and 16 years and more, respectively.

Rai (2014) in his study on e-readiness of Krishi Vigyan Kendra functionaries in Uttar Pradesh reported that majority (70.89%) of the extension personnel had medium experience (between 5 to 18 years) whereas 19.02 per cent and 10.09 per cent belonged to high and low level experience categories respectively.

Raghava and Punnarao (2014) reported that half (50.00%) of the extension personnel had experience of 10 years in KVKs, followed by 22.00 per cent of the respondents having 19 years of experience and 28.00 per cent of the respondents having an experience of 20 years.

Khamoushi and Gupta (2015) reported that 38.00 per cent of the extension personnel were in medium category of experience (125 – 251 months), while

36.00 per cent of them were in less experience category (less than 125 months) and one-fourth (25.00%) of the respondents were in high category of service experience (more than 251 months).

2.1.5 Achievement motivation

Mohan (2000) reported that 19.21, 69.51 and 12.19 per cent of the assistant agricultural officers were having high, medium and low level of achievement motivation, respectively.

Kiran (2007) reported that a majority of teachers (84.70%), researchers (77.08%) and extension workers (64.29%) belonged to medium level of achievement motivation category.

Prodhan and Afrad (2014) in their study on knowledge and perception of extension workers towards ICT utilization revealed that 31.10 per cent of respondents had low level of achievement motivation, whereas 45.60 per cent had medium level of achievement motivation and the remaining 23.30 per cent had high level of achievement motivation.

Gopika *et al.* (2015) reported that half (50.00%) of the Assistant Horticulture Officers were belonging to medium level of achievement motivation, whereas 30.00 and 20.00 per cent of them were belonging to high and low level of achievement motivation, respectively.

Raksha *et al.* (2016) in their study on e-readiness in agricultural extension system stated that the motivational component of the e-readiness gives a good picture that although respondents have low software literacy, their motivation to learn and improve is high, which can be better utilized for agricultural extension activities.

2.1.6 Innovation proneness

Frempong *et al.* (2006) in their research study on 'challenges of infusing information and communication technologies in extension for agricultural and rural development in Ghana', revealed that a vast majority (96.20%) of the respondents could create opportunities to introduce new teaching approaches for training of extension agents.

Parida (2010) revealed that 40.83 per cent of the online communication services users were found to have high innovativeness.

Prodhan and Afrad (2014) in their study on 'Knowledge and perception of extension workers towards ICT utilization', revealed that majority (55.60%) of the respondents had high level of innovativeness, while 23.30 per cent had medium level of innovativeness and 21.10 per cent had low level of innovativeness.

Rai (2014) in his study on 'E-readiness of Krishi Vigyan Kendra functionaries in Uttar Pradesh', revealed that majority of the respondents (68.66%) had medium degree of innovation proneness, whereas 23.14 per cent had low degree of innovation proneness and 8.20 per cent had high degree of innovation proneness.

Chitra (2015) revealed in her study that more than two-third of the extension personnel (71.33%) had only medium level of innovation proneness. High level of innovation proneness was noted among 14.66 per cent of the extension personnel.

2.1.7 Job performance

Rezaei *et al.* (2010) in Iran indicated that almost half of the respondents (50.7%) were under intermediate level of job performance, whereas 38.8% under high and 10.4% were under low level of job performance category

Nongtdu *et al.* (2012) in their study training needs of agricultural extension personnel in Meghalaya found that majority (60%) of the respondents (agricultural extension personnel) had medium level of job performance.

Debnath *et al.*, (2014) on their study on job performance of extension personnel in Tripura reported that 40.63 per cent of the Agricultural Officers had high job performance and 37.50 per cent of the village level workers (VLWs) had medium job performance.

Rai (2014) elucidated that majority (75%) of the KVK personnel in Uttar Pradesh had medium degree of job performance, 17 per cent had high job performance and 8 per cent had low degree of job performance.

Olatunji *et al.* (2015) in their study on the job performance and job satisfaction of agricultural extension agents in the rivers state agricultural development project of Nigeria revealed that the extension agents were generally satisfied with their job routine. The pooled mean was 2.8 and ranked first among indices of job satisfaction assessed indicating that most of the extension agents were self-motivated and were satisfied with their job routines of fixed field visits, attendance to forth-night training meetings, establishing of on farm research and mobilizing farmers to establish small pot adoption techniques.

Akoijam *et al.* (2018) reported that in Manipur, majority of the respondents (61.11%) had medium level of role performance followed by 22.22 per cent respondents who had high level of role performance. The rest 16.67 per cent had low level of role performance.

2.2 Variables related to ICTs

2.2.1 Possession of smart gadgets

Frempong *et al.* (2006) reported that 23.4 per cent of the respondents owned their own personal computer and 60.8 percent of them possessed telephone.

Wims (2007) in his study on an analysis of adoption and use of ICTs among Irish farm families, it was found that 56 per cent of respondents owned a personal computer while 48 per cent had home internet connectivity.

Devi (2017) in her study on the usage of information and communication technologies by rural youth of Manipur reported that access and utilization of ICTs among rural youth was highest for mobile phones (88.83 %) and television (68.62%).

2.2.2 Sources of awareness about ICT tools

Raksha (2014) in her study opined that 94 per cent respondents have awareness about ICTs through interpersonal communication channels like family members, friends and colleagues followed by mass media channels (84.44%) like newspaper/magazines/books etc., trainings (81.67%) and internet (57.78%).

Aguilar-Gallegos *et al.* (2015) pointed out that diversified and tailor-made extension strategies should be designed for the conditions of specific target groups. One such extension strategy is the use of information and communication technologies (ICT) for dissemination of information to farmers.

2.2.3 Trainings attended on ICTs

Frempong *et al.* (2006) in their research study on 'Challenges of infusing information and communication technologies in extension for agricultural and rural development in Ghana', revealed that 23.70 per cent of the respondents had attended professional courses on ICT, while 29.20 per cent of the respondents had received ICT trainings on their own at community learning centers.

Karuna and Sandhya (2009) revealed that majority (62.00%) of the agricultural professionals working in KVKs had undergone training in use of MS Office and Office automation, 44.00 per cent in use of Internet and e-mailing, 20.00 per cent

in Web designing and Development and two per cent in programming and software development aspects of ICTs.

Raghava and Punnarao (2014) found that 16.00 per cent of the extension functionaries had attended one training programme on ICT and 26.00 per cent of them had attended more than two trainings on ICT. Majority of the scientists (58.00%) did not receive any formal training on ICT, but they were using ICT with practical experience.

Kabir (2015) reported that a vast majority (88.90%) of the extension personnel had participated in training programme on ICTs.

Khamoushi and Gupta (2015) observed that majority (67.53%) of the extension personnel had not received ICT training.

Afzal *et al.* (2016) in their study on 'Attitude of agricultural extension workers towards the use of e-extension for ensuring sustainability in Saudi Arabia' reported that a majority (67.80%) of the respondents had computer training and 32.20 per cent of them denied having any computer training.

Agha *et al.* (2018) reported that 40.00 percent of ADOs and BAOs received specialized training on ICT and remaining 60.00 percent did not receive any training.

2.3 Attitude towards the use of ICTs

Cullen (2001) reported that his respondents showed negative attitude towards the use of ICTs in agriculture.

Babu (2005) in his study reported that maximum of his respondents had favourable and highly favourable attitude with respect to ICTs. It was also observed that attitude towards the ICTs had significant relationship with e-readiness.

Chen and Tsai (2005) revealed that female respondents showed less favourable attitude than male respondents regarding web based learning.

Kumar (2008) in their study elucidated that 66.67 per cent, 18.33 per cent and 15.00 per cent extension personnel showed favourable, more favourable and less favourable attitude towards the use of ICTs in extension respectively.

Seetharam (2010) found that 60 per cent of the people in rural areas perceived that programme delivered to the farmers via mobile phones was good while 12 per cent of the farmers felt that the programs were excellent.

Hassan *et al.* (2011) revealed that a larger number of extension workers had high level of attitude (45.80%) towards ICT usage followed by moderate (35.40%) and low (18.80%) level of attitude.

Nagalakshmi and Swamy (2011) revealed that approximately two-thirds of extension personnel working in RSK were having high level of positive attitude (73.53%) followed by low level (14.70%) and medium level (11.77%) of positive attitude towards ICT tools.

Rajashekar and Sandhya (2011) observed that extension personnel working in NGOs had positive attitude towards ICTs.

Thanuskodi (2011) revealed that the researchers in social sciences were more positive about the use of the Internet and its impact on their educational experience. All of them (100.00%) had a positive attitude towards the Internet and feel comfortable in gaining information through it for academic and personal purposes. Further, 95.00 per cent of the researchers in social sciences who use the Internet agreed that Internet use had a positive impact on their study, research and extension work.

Verma *et al.* (2012) reported that majority (56.87%) of the respondents had favourable attitude towards ICT application in agriculture. While, 25.63 per cent of the extension work force had most favourable attitude and 17.50 per cent extension personnel possessed least favourable attitude towards application of ICT in agriculture. In Government organizations 61.25 per cent of the respondents showed favourable attitude towards the use of ICT in agriculture, whereas 17.50 per cent and 21.25 per cent respondents showed most favourable and least favourable attitude respectively towards ICT application in agriculture. In NGOs it was found that 52.50 per cent of the respondents showed favourable attitude while 33.75 and 13.75 respondents showed most and least favourable attitude towards the application of ICT in agriculture respectively.

Ajayi *et al.* (2013) observed that majority (72.00%) of the extension agents had indifferent attitude towards ICT use, while 15.00 per cent of the extension agents had unfavourable attitude towards ICT use and 13.00 per cent of the extension agents had a positive attitude towards ICT use.

Chhachhar and Salleh (2013) in his study in Malaysia reported that 46.70 per cent of the respondents admitted that mobile message service had contributed towards increasing productivity of ICT tools.

Anand and Ravichandra (2014) observed that a larger number of the extension personnel (45.45%) were found to possess favourable attitude towards ICT tools followed by 30.58 per cent having less favourable attitude and the rest 23.97 per cent of the extension personnel having more favourable attitude towards ICT tools.

Haji *et al.* (2014) reported that the extension workers had a positive attitude towards using ICTs. They mostly viewed it as a useful tool for extension, which can potentially save money and time.

Proadhan and Afrad (2014) in their study on 'Knowledge and perception of extension workers towards ICT utilization', observed that a majority (64.40%) of the extension workers had moderate favourable attitude towards the use of ICTs, whereas 20.00 per cent had highly favourable attitude and 15.60 per cent had less favourable attitude towards ICTs.

Raksha *et al.* (2015 a) reported that 40.00 per cent of the extension personnel had favourable attitude towards ICTs in agricultural extension, followed by highly favourable (28.89%), neutral (20.56%) and unfavourable (11.11%) attitude.

Kabir and Roy (2015) reported that a vast majority (93.80%) of the extension professionals had highly favourable attitude towards ICTs, while 6.30 per cent of them had moderately favourable attitude.

Afzal *et al.* (2016) reported that agricultural extension workers had a positive attitude towards the use of e-extension in the Kingdom of Saudi Arabia.

Sadegh *et al.* (2016) reported that majority of the extension personnel had weak (44.40%), average (27.00%), good (15.80%) and excellent (12.80%) attitude towards precision agriculture using advanced ICTs.

2.4 Access to ICTs

Franda (2002) reported that in August 2000, when there were an estimated 1.6 million subscribers and 4.8 million users (0.37 per cent of the overall Indian population), more than three-fourths (77 per cent) of these users were from New Delhi and the capitals of Indian states. Two cities- Delhi and Mumbai- alone accounted for more than one third of all users. Maharashtra with 453,000 accounted for 28 per cent of the total. On the other hand, two of India's most populous states – Uttar Pradesh and Bihar – had only 20,000 and 8,000 respectively.

Frempong *et al.* (2006) in their study challenges and prospects of infusing information communication technologies in extension for agricultural and rural development in Ghana elucidated that 41.2 per cent of extension agents use ICTs at

office, 7.9 per cent of extension agents at library and 23.4 per cent owned and use ICTs (Computer and accessories) at home.

Ganesamoorthi *et al.* (2006) found that in comprehension, only NISI module was effective than CTM. Out of the 11 variables studied, variables such as ICT literacy, academic performance, achievement motivation, ICT accessibility and attitude towards ICT were having significant correlation with knowledge gain; variables such as parental influence, academic performance, age and rural urban background were significantly correlated with comprehension; variables such as academic performance, ICT literacy, parental influence and achievement motivation were significantly correlated with application and variables such as ICT literacy and attitude towards ICT were significantly correlated to retention. Even though the respondents differed significantly in rating of their CAIMs, over sixty percent in each group agreed that these modules are good for learning.

Agwu *et al.* (2008) in their study on use of information communication technologies (ICTs) among researchers, extension workers and farmers in Abia and Enugu States reported that 65 per cent of the researchers, 56 per cent of the extension workers and 33 per cent of the farmers had access to ICT facilities.

Meena *et al.* (2012) reported that India is the hub for ICT initiatives aimed at agricultural development. In last few years, several organizations started harnessing ICTS in providing some extension service. It is estimated that as many as 3500 ICT initiatives are in place at one or other point of time.

Shekh and Patel (2012) reported that agro-advisory services tend to provide a variety of agriculture related information on crop cultivation, fertilizer use, plant diseases, pesticides, market prize weather and important government policy decision. In Krishi Vigyan Kendra (KVK) system in India, Kisan Mobile Advisory (KMA) and voice Krishi Vigyan Kendra mobile phone based extension programmers have been initiated to provide timely and need-based farm advisory to farmers.

Singh (2012) reported that two hundred farmer's beneficiaries of ICT programme Kisan Mobile Advisory services being provided through SMS by Krishi Vigyan Kendra Rewa (M.P.) were interviewed. The majority of the respondents (69%) perceived that it has helped the farming community to enhance the crop production, vegetable production, application of improved crop protection practices and provided new avenues for value addition and income generation.

Ezeh (2013) in his study extension agents access and utilization of information and communication technology (ICT) in extension service delivery in South

East Nigeria revealed that most of the extension agents accessed radios (98.33%), television (85.83%) and mobile phones (81.67%) for information.

Nagasree *et al.* (2008) reported that information access through touch screen kiosks, queries addressing system through interactive voice enquiry system, internet and display announcement system for farmers are the essential features of the knowledge share contacts.

Sumi (2017) reported that among extension personnel in Dimapur district of Nagaland, 55 per cent had medium access to ICTs followed by 25 per cent had high access and 20 per cent had low access to ICTs.

2.5 Purpose of accessing ICTs

Mabe and Oledede (2012) reported that majority of extension officer had good knowledge about computer, internet and websites which were used for accessing agriculture information.

Ragul *et al.* (2016) reported that cent per cent extension personnel used internet, search engine, web based agriculture portal, e-newspaper and e-agriculture magazine followed by television (80.33%), computer (62.50%), and video conferencing (19.17%) for purpose of getting information or enriching their knowledge in the field.

Sulibhavimath and Sharma (2018) reported that majority of the KVK extension personnel of both the states (Punjab and Karnataka) always used google search engine for acquiring knowledge under different purposes. Majority of the respondents of both the states always used telephone/ mobile phone, camera, MS service system and whatsapp (social media application) for disseminating knowledge to farmers. Overall maximum number of ICT and tools were used for updating knowledge and giving advice to farmers.

2.6 Utilization of ICTs

Apparap (2007) revealed that 1.87 per cent of village agricultural worker, 65.00 per cent of agricultural extension officers and 86.00 per cent of subject matter specialist did use mass media for dissemination of technology to the farmers.

Okello *et al.* (2010) revealed that farmers in Kenya have high level of awareness and widespread use of mobile phones, mainly for social purposes.

Olajide and Uwaya (2013) reported that majority of extension personnel used mobile (86.2%) and short message services (81.0%) as ICT tools for information dissemination.

Pandey *et al.* (2015) in their on youth of Hisar reported that maximum youth didn't had compendious knowledge about ICT. After joining colleges and universities for higher education, the youth started using modern ICT tools like laptop, mobile or computer. Youth had maximum access to internet in home, college, office or university. Majority of the respondents used internet 5 hours or more in a day.

Ragul *et al.* (2016) in their study utility pattern of ICT tools for transfer of technology elucidated that cent per cent extension personnel used internet, search engine, web based agriculture portal, e-newspaper and e-agriculture magazine for purpose of getting information. Extension personnel used radio (81.67%), television (19.17%), and computer (12.50%) for transfer of technology.

Chavai *et al.* (2017) in their study on utility pattern of ICT tools for transfer of agricultural technology by the extension personnel revealed that, 60.00 per cent of the Maharashtra State Department of Agriculture (MSDA) extension personnel belonged to medium utilization of ICT tools, followed by high (20.91%) and low (19.09%) category, respectively.

Sumi (2017) in her study found that cent per cent of extension personnel used mobile phones for information dissemination, consultation and follow up, evaluating the extension programmes but only 15 per cent of them used mobile for accessing rural development schemes and services. It is also noticed that 75 per cent, 60 per cent and 50 per cent of extension personnel utilised computer for supervision and evaluation, information collection and training purposes respectively.

2.7 E-Readiness

Meera *et al.* (2010) studied e-readiness perception of extension workers and revealed that 63 per cent have moderate and 32 per cent have high level of e-readiness.

Mabe and Oladele (2015) operationalized e-readiness of extension officers as a composite score of awareness, availability, accessibility, competencies, and importance of information and communication technology (ICT) tools and found that the significant determinants of e-readiness include living in the job area ($t = 2.35$, $p < .05$), means of mobility (2.72), educational level (1.68), number of farmers covered (1.93), working experience (1.80), and age (-2.53).

Mohamed and Mohamed (2015) in their study measuring electronic readiness of extension personnel in Assiut Governorate revealed that extension personnel showed low level of e-readiness in utilizing ICTs in agricultural extension.

Raksha *et al.* (2016) in their study on e-readiness in agricultural extension system reported that majority (76.67%) of the respondents were able to use computers or laptops without any other's assistance followed by internet use (70.00%) and handing smart phone (35.00%).

Olaulo *et al.* (2018) reported from their study that the majority (76.6%) of the respondents opined that their computers were not in functional state. On their proficiency of computer usage, power point presentation (M= 2.00), email operation (M= 2.00) and excel spread sheet (M= 2.00) had the highest perceived proficiency. Public extension personnel in the State were barely ready on the resources available (RA = 1.97) and not ready on the accessibility to ICT (AICT = 1.35) and barely ready based on their perceived quality of ICTs (PQICT = 1.69), as well as perceived importance of ICTs (PIICT = 2.14) on the adherence to policies and regulations, they were barely ready (P&R= 1.93). In all public extension personnel in Benue State were barely ready (e-readiness = 1.816).

2.7 Problems encountered while using ICTs

Kumar and Kaur (2005) found that the most common problems faced by the extension professionals in surfing the internet were inordinate delay in retrieving relevant information , difficulty in finding the relevant information, slow access speed and overload of information on the internet.

Lack of expertise, knowledge, and technical assistance, lack of facility at individual level, lack of necessary peripherals and discontinued electricity supply were the major constraints of the farm scientists while using ICT tools (Sridhara, 2005).

Adebayo and Adesope (2007) found that most of extension personnel did not have computers in their offices. Those who indicated that they have personal computers in their offices reported that computers are not connected to the Internet.

Akpabio *et al.* (2007) stated that poor ICT infrastructure development, high cost of broadcast equipment, high cost of access /interconnectivity and poor electric supply were the major problems faced by extension officers.

Agwu *et al.* (2008) reported that lack of ICT infrastructure, lack of sufficient trained computer personnel, erratic power supply, poor finance and lack of internet access in the rural areas are the major problems of extension workers in using ICT tools.

Salau and Saingbe (2008) in their study on 'access and utilization of information and communication technologies (ICT) among agricultural researchers and

extension workers', revealed the major problem of lack of electricity by agricultural researchers (62.22%) and extension workers (82.21%) in using ICTs.

Karuna and Sandhya (2009) indicated that lack of ICT knowledge, no sufficient training in use of modern ICT tools, frequent power failure, poor connectivity at village level, insufficient number of computers and service problems were the major problems expressed by the agricultural extension professionals while using ICTs for professional purpose.

Singh *et al.* (2009) found that low speed internet access, erratic power supply and lack of required full text journals are the problems with regards to the use of Internet based e-resource by extension professionals.

Tayade *et al.* (2011) reported that majority (80.00%) of the extension personnel faced the problem of less availability of ICT gadgetry in Krishi Vigyan Kendras. This was followed by lack of LCD facility available (76.67%), less availability of CD writer (73.34%), less number of computers for assessing collected data (72.10%), unavailability of inverter and lack of printing facility (70.00%), lack of electricity (66.67%), and internet dis-connectivity (50.00%).

Subash *et al.* (2013) indicated that inadequate availability of computer and internet facilities, slow function of ICT tools and negligence towards internet-oriented education and training were the major constraints of farm scientists.

Tanko *et al.* (2013) reported that lack of access roads to move equipment, no room for interactive communication, high cost of equipment and lack of expertise were some of the emerging problems expressed by the extension officers in using ICT tools.

Anurag *et al.* (2013) revealed that a majority of the extension workers (97.00%) perceived themselves as incompetent in reading and interpreting satellite imaging for agricultural information dissemination.

Lack of technically competent extension personnel, poor maintenance, insufficient budget allocation for ICTs, erratic internet connectivity, lack of up gradation of ICT equipment, insufficient number of ICT tools in the organization, technical and infrastructure problems and lack of training to employees for using ICTs were the major constraints in utilizing the ICT tools (Sireesha *et al.*, 2014).

Agwu and Ogbonah (2015) reported that lack of training opportunities, insufficient availability of ICT facilities and lack of technical know-how were perceived by the extension agents to be the serious constraints in the use of CTs for official functions.

Chapter 3

Methodology

In this chapter, the empirical measures designed to quantify different variables, procedures used in sampling, collection of data and statistical tests used for analysis of data are described in the following headings:

- 3.1 Research design
- 3.2 Location of study
- 3.3 Selection of variables
- 3.4 Operationalization and measurement of variables
- 3.5 Data collection
- 3.6 Statistical tools used for data analysis

3.1 Research design

Descriptive research design (it only describes the characteristics and findings of the study) was adopted for conducting the study. This design was considered appropriate because it involves observing and describing the behaviour of a subject without influencing it in any way.

3.2 Location of study

The research was conducted in the state of Meghalaya. In the Meghalaya state Ri-Bhoi district was selected purposively since majority (8) of the agricultural institutions are present in the selected district.

Table 3.1: Demographic details of Ri-Bhoi district

Total area	2378 Sq. Km	Total villages	589
Total Population	258840	Average literacy	75.67%
Males	132531	Male literacy	76.79%
Females	126309	Female literacy	74.49%
Density	106 persons per square km	Sex ratio	953 females per 1000 males
Major Agricultural crops		Rice, maize, rapeseed and mustard	

Source: <https://ribhoi.gov.in/demography>

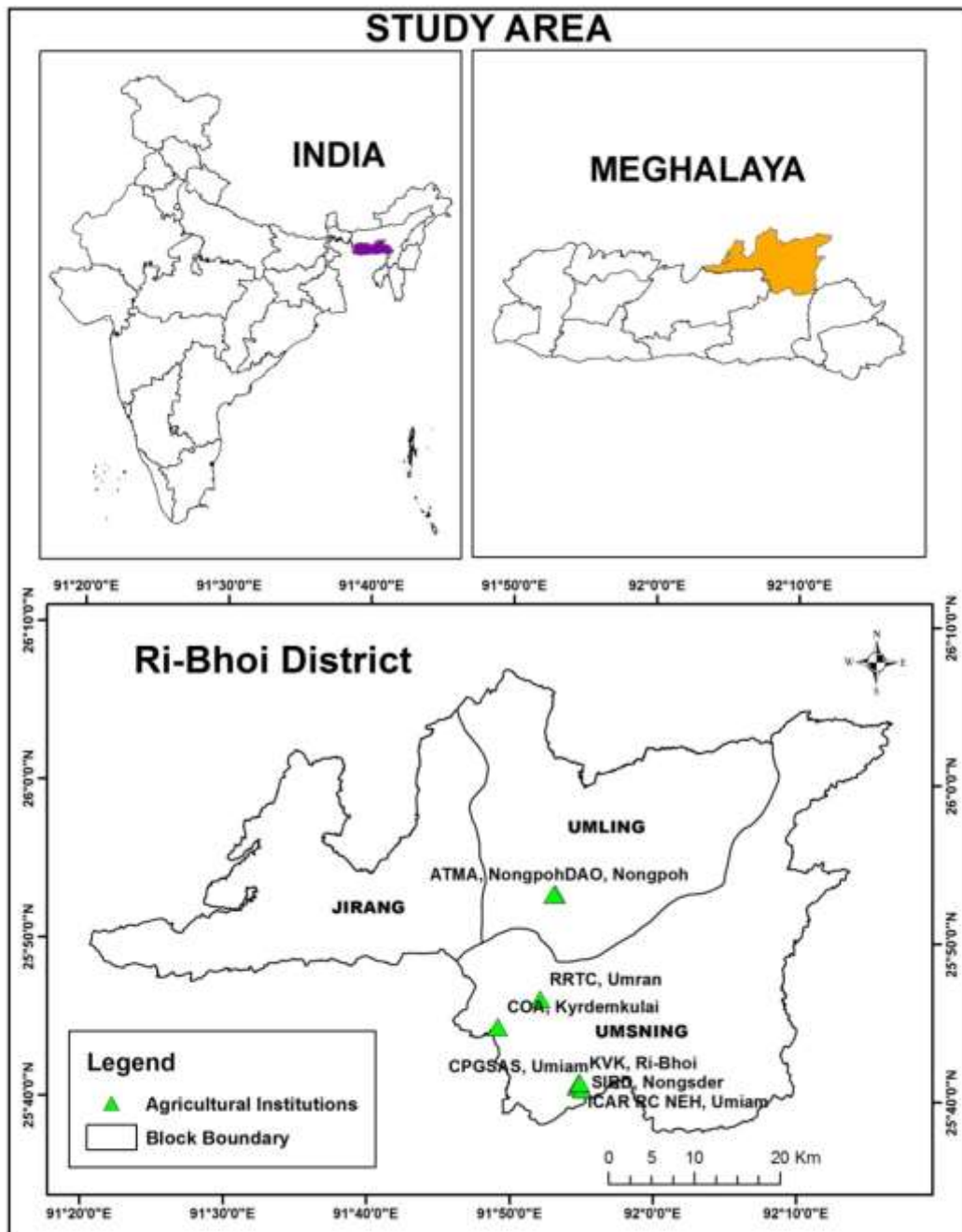
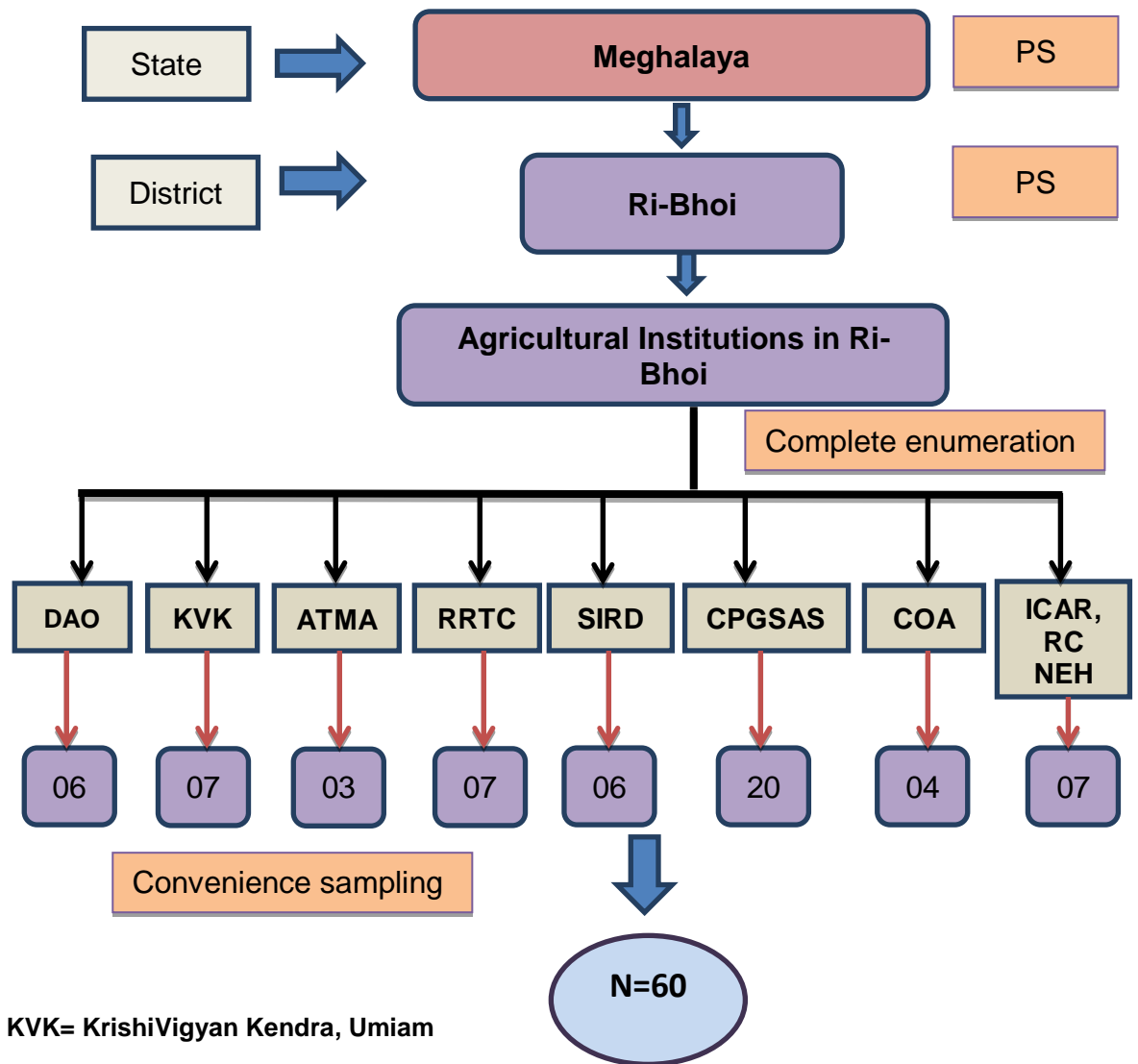


Fig 1: Map showing study area



KVK= KrishiVigyan Kendra, Umiam

DAO= District Agricultural Office, Nongpoh

ATMA= Agricultural Technology Management Agency, Nongpoh

RRTC= Rural Resource and Training Centre, Umran

SIRD= State Institute for Rural Development, Nongsder

CPGSAS= College of Post Graduate Studies in Agricultural Sciences, Umiam

COA= College of Agriculture, Kyrdemkulai

ICAR RC = Indian Council for Agricultural Research, Research Complex for North Eastern Hill Region, Umiam

***PS- Purposive Sampling**

Fig 2: A detailed sampling plan of the study

3.2.1 Selection of institutions

Complete enumeration technique was followed for selecting institutions and all the agricultural institutions in Ri-Bhoi district were selected for the study. The following are the list of agricultural institutions in Meghalaya.

1. District Agriculture Office (DAO), Nongpoh
2. Krishi Vigyan Kendra (KVK), Umiam
3. Agricultural Technology Management Agency (ATMA), Nongpoh
4. Rural Resource and Training Centre (RRTC), Umran
5. State Institute for Rural Development (SIRD), Nongsder
6. ICAR RC for NEH region, Umiam
7. College of Post Graduate Studies in Agricultural Sciences (CPGSAS), CAU(I), Umiam and
8. College of Agriculture (COA), CAU(I), Kyrdemkulai

3.2.2 Selection of respondents

All the respondents (who were willing to provide the required information voluntarily) involved in the research, teaching, extension and training from the 8 selected agricultural institutions were selected for the study. Data was collected from 60 respondents from selected 8 agricultural institutions. Data collection was done between 28/01/2019 and 10/04/2019. Twenty personnel from CPGSAS, seven personnel from ICAR RC for NEH, three personnel from ATMA, six personnel each from SIRD and DAO, seven personnel from KVK and DAO, and four personnel from COA, Kyrdemkulai provided the required information. The total sample constituted to 60.

Table 3.2: Selection of respondents from agricultural institutions

Sl. No.	Agricultural Institution	Personnel selected for the study
1	CPGSAS, CAU (I), Umiam	20
2	ICAR RC for NEH region, Umiam	7
3	RRTC, Umran	7
4	DAO, Nongpoh	6
5	KVK, Umiam	7
6	ATMA, Nongpoh	3
7	SIRD, Nongsder	6
8	COA, CAU (I), Umiam	4
	GRAND TOTAL	60

3.3 Selection of variables

In view of the objectives of the study the following variables are selected and presented in table given below along with their empirical measurement tools. The relevant independent variables are selected after discussion with the experts.

Table 3.3: Variables and their measurement tools

Sl. No.	Variables	Empirical measurement tools
INDEPENDENT VARIABLES		
1.	Age	Chronological age in years
2.	Gender	Biological characteristics of the respondents indicating either male or female
3.	Educational qualification	Schedule was developed
4.	Area of Specialization	Schedule was developed
5.	Job experience	Direct Questioning
6.	Trainings attended	Schedule was developed
7.	Innovation proneness	Scale by Moulik (1965)
8.	Achievement motivation	Scale developed by Rani (1985) as used by Raksha (2014)
9.	Job performance	Scale developed by Jeeva (2008)
10.	Sources of awareness of ICT tools	Structured schedule was developed
11.	Possession of smart gadgets	Check list
12.	Access to ICT tools	Schedule developed by Raksha (2014)
13.	Utilization of ICTs	Schedule developed by Raksha (2014)
14.	Attitude towards ICTs	Scale developed by Raksha (2014)
DEPENDENT VARIABLE		
15.	e-Readiness	Scale developed by Raksha <i>et al.</i> (2016) was adapted

3.4 Operationalization and measurement of the variables

3.4.1 Age

Age is operationalized as the number of years chronologically completed by the respondent at the time of investigation. Based on the completed years respondents are categorised in to three groups based on mean and standard deviation.

Category	Age
Young	<(mean – standard deviation)
Middle	(mean ± standard deviation)
Old	>(mean + standard deviation)

3.4.2 Gender

It refers to the biological characteristics of the respondent indicating either male or female. The gender of the respondents was categorized as given below.

Gender	Score
Male	1
Female	2

3.4.3 Educational Qualification

Education qualification is operationalized as the number of years of formal schooling completed by the respondents. Education qualification of the respondents was categorised as given below.

Educational Qualification	Score
Graduate	1
Post graduate	2
Doctorate	3

3.4.4 Area of specialization

In the present study, the area of specialization was divided into extension, research, training and teaching. Frequency and percentage were calculated for each category.

3.4.5 Job Experience

It was operationalized as the number of years of service completed by the extension functionaries in performing his/her job at the time of investigation. Job experience of respondents was categorized under 3 categories.

Category	Score
Low (less than 4 years)	1
Medium (4 to 19 years)	2
High (More than 19 years)	3

3.4.6 Trainings attended on ICTs

Training is an intensive learning activity for respondents by competent trainers to understand and practice computers/ICTs Tools for accessing and disseminate information on their own.

It is operationally defined as training received by the respondents in ICTs. Percentage is calculated for the discussion purpose.

3.4.7 Innovation proneness

It refers to the behavioral pattern of an individual who has interest and desire to seek changes in extension techniques and is ready to introduce such changes which are practical and feasible. It was measured by scale developed by Moulik (1965) with minor modifications. There were total nine statements measured on 5 point continuum of Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (DA) and Strongly Disagree (SDA) with weight of 5, 4, 3, 2 and 1 for positive statements and 1, 2, 3, 4 and 5 for negative statements respectively. The summation of scores of all the statements gives the total scores of innovativeness of each respondent. Based on actual scores obtained by respective respondents, respondents were grouped into three categories as given below.

Category	Range
Low	< (mean – standard deviation)
Medium	(mean ± standard deviation)
High	>(mean + standard deviation)

3.4.8 Achievement motivation

It is defined as the degree for excellence to attain a sense of personal accomplishment.

Achievement motivation of the respondents was measured by using the scale developed by Rani (1985) with little modification. All the nine statements were

rated on five point continuum as Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (DA) and Strongly Disagree (SDA) with weight of 5, 4, 3, 2 and 1 for positive statements and 1, 2, 3, 4 and 5 for negative statements respectively. Total score was obtained by summing up the score of all items. Based on the obtained scores, respondents were grouped into three categories as given below.

Category	Range
Low	< (mean – standard deviation)
Medium	(mean ± standard deviation)
High	>(mean + standard deviation)

3.4.9 Job performance

The variable was measured with the help of scale developed by Jeeva (2008) it was operationalized as the self-assessment on the extent of performance of various job characteristics. Here, the 15 scale items were rated on a three-point continuum viz., good, average and poor with the scores of three, two and one, respectively. The total score for a respondent was obtained by adding up the scores seemed by him/her for all the 15 items. Based on the total scores and cumulative frequency distribution, the respondents were categorized as good, average and poor with regard to their overall job performance. Item-wise frequencies and percentages were also worked out to have an in-depth understanding about the job performance. The respondents were categorized into low medium and high job performance on the basis of mean and standard deviation.

Category	Score Range
Low	< (mean – standard deviation)
Medium	(mean ± standard deviation)
High	>(mean + standard deviation)

3.4.10 Sources of awareness about ICT tools

In the present study, sources of awareness about ICTs were assessed with the help of different sources of information from where the respondents become aware of ICTs. Here a list of various ICTs tools are presented to the respondents with sources of information i.e. family members, through newspapers, office/institutions, trainings, summer/winter camp, internet friends or colleagues and asked to indicate

their responses. Weightage of 1 is given to each response, frequencies and percentages were calculated for discussion purpose.

3.4.11 Access and frequency of use of ICT tools

Access refers to the ability/inability of persons to avail of and participate in a widely available service (Fathaigh, 2002). Frequency of use ICTs tools was operationalized as the frequency of use of ICTs by the respondents, daily, weekly twice, less than fortnightly and fortnightly. In the present study, frequency refers to the number of times a ICTs tool can be used. It was measured by assigning a score of 2 for availability and 1 for non-availability. Further a score of 2 was given to, if available in use and 1 for if it is not use, despite the availability. Frequency of use was scored as 4, 3, 2 and 1 for daily, weekly twice, less than fortnightly and fortnightly respectively. The respondents were categorized into three categories viz; low, medium and high as given below.

Category	Score Range
Low	< (mean – standard deviation)
Medium	(mean ± standard deviation)
High	>(mean + standard deviation)

3.4.12 Utilization of ICTs

Utility of ICTs tools was measured by presenting a list of various ICTs tools to the respondents with purpose of utility i.e. planning, implementation, evaluation etc. in extension work, where ICTs could be used. A score of 2 was given to useful and 1 for not useful. With regard to purpose of utility of ICTs, again a score of 1 was given to each purpose of utility where the ICTs tools may be used. The scores were summed up to get the total score of each respondent. Frequencies and percentages were calculated for discussion purpose.

3.4.13 Attitude towards ICTs

Attitude is an organized predisposition to think, feel and perceive and behave towards a cognitive object. Thrustone (1946) is defined attitude as the degree of positive or negative affect associated with some psychological object. By a psychological object, Thrustone means any symbol, phrase, slogan, person, and institution, idea towards which people can differ with respect to positive or negative effect. Attitude in this study was operationalized as the degree of positive or negative feeling of extension personnel towards ICTs in agricultural extension system.

The respondents were categorized into five categories as given below. Frequency and percentage were calculated.

Category	Score Range
Highly Unfavourable	0-20
Unfavourable	21-40
Neutral	41-60
Favourable	61-80
Highly Favourable	81-100

3.4.14 e-Readiness

In the present study, for measuring e-readiness of the extension personnel, an index developed by Raksha *et al.* (2016) is used.

a. e-Readiness availability

In the present study, availability is operationalized as the ICTs available to the respondents whether at personal level or at official level. The responses were categorized into two point continuum. A score of 2 was given for Yes and 1 for No response. Total score was obtained on various items were added to get total scores of the respondents on this variable.

b. e-Readiness accessibility

In the present study, accessibility is operationalized as whether the available ICTs are accessible or not to the respondents. The responses were categorized into five point continuum ranging from strongly agree, agree, undecided, disagree and strongly disagree and a score of 5, 4, 3, 2 and 1 was given respectively. Total score was obtained on various items were added to get total scores of the respondents.

c. e-Readiness basic ICTs skills

In the present study, basic ICTs skills are operationalized as the respondent's ability to use the ICTs at basic level. The responses were categorized into five point continuum ranging from strongly agree, agree, undecided, disagree and strongly disagree and a score of 5, 4, 3, 2 and 1 was given respectively. Total score was obtained on various items were added to get total scores of the respondents on this variable.

d. e-Readiness internet skills

In the present study, Internet skills are operationalized as the respondent's working knowledge on the use of Internet. The responses were categorized into five point continuum ranging from strongly agree, agree, undecided, disagree and strongly disagree and a score of 5, 4, 3, 2 and 1 was given respectively. Total score was obtained on various items were added to get total scores of the respondents on this variable.

e. e-Readiness software literacy

In the present study, software literacy is operationalized as the respondent's knowledge on different softwares related to ICTs and working knowledge of its use. The responses were categorized into five point continuum ranging from strongly agree, agree, undecided, disagree and strongly disagree and a score of 5, 4, 3, 2 and 1 was given respectively. Total score was obtained on various items were added to get total scores of the respondents on this variable.

f. e-Readiness motivational factors

In the present study, Motivational factors are operationalized as the respondent's psychological readiness to learn ICTs skills. The responses were categorized into five point continuum ranging from Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree and a score of 5, 4, 3, 2 and 1 was given respectively. Total score was obtained on various items were added to get total scores of the respondents on this variable.

g. Categorization of the respondents

The score of e-readiness of respondents was obtained by summing up the scores obtained under each sub components. Based on the obtained scores, the respondents were categorized as given below.

Category	Score Range
Low	< (mean – standard deviation)
Medium	(mean ± standard deviation)
High	>(mean + standard deviation)

3.5 Data collection

The questionnaire was developed in line with the objectives of the research study. It was distributed by the researcher personally to the extension personnel (based on availability and who were voluntarily willing to provide the required information) in their respective institutions. The researcher explained the purpose of the investigation to the extension personnel and clarified the doubts of the extension functionaries while filling the questionnaire.

3.6 Statistical tools used for data analysis

3.6.1 Frequency

Frequency was employed to know the distribution pattern of the extension functionaries into the different categories of a variable. It was measured as the number of respondents or responses in a particular category.

3.6.2 Percentage

Percentage was used for standardization of size of responses per hundred of such measurement.

$$\text{Percentage} = \frac{\text{Score obtained}}{\text{Total obtainable score}} \times 100$$

3.6.3 Class interval

Exclusive method of class interval was used to categorize certain variables. Class interval is difference between the upper and lower limit of a class and is calculated using the following formula.

$$C I = \frac{\text{Maximum Score} - \text{Minimum Score}}{\text{No. of Classes}}$$

Where, C I = Class Interval.

3.6.3 Arithmetic mean

It is defined as the sum of all values of the observations divided by the total number of observations. It was used for the categorization of respondents on all the variables of the study.

$$\bar{x} = \frac{\sum x}{n}$$

Where,

\bar{X} = Mean

$\sum x$ = Sum of all the items

n = Number of items

3.6.4 Standard deviation

It is the positive square root of the squared deviations taken from the arithmetic mean. It was used to find out the variation in the scores on variables and categorization of respondents. Both mean and standard deviation were used to classify the respondents into low, medium and high level.

It is calculated using the formula

$$SD = \sqrt{\frac{1}{n-1} \left[\sum x_i^2 - \frac{(\sum x_i)^2}{n} \right]}$$

Where

SD = Standard deviation

X = Sum of the deviation of the scores from the mean

\sum = Summation

n = Number of items

$\sum x_i^2$ = Sum of squares of all items

$(\sum x_i)^2$ = Square of summation of all the items

3.6.5 Correlation co-efficient

The term correlation coefficient is used to denote the degree of relationship between two variables. In this it is concerned with the linear relationship between the two variables. It is calculated by using the following formula

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}}$$

Where

r = Correlation coefficient

n = Number of pairs of scores

Σxy = Sum of product of paired scores (x and y)

Σx = Sum of x scores

Σy = Sum of y scores

Σx^2 = Sum of squared x scores

Σy^2 = Sum of squared y scores

Chapter 4

Results and Discussion

In this chapter, the results obtained in the investigation based on empirical data are presented and discussed. The data was analysed using appropriate statistical tools and tabulated keeping the objectives in view. The findings of the investigation are presented under following sub headings.

- 4.1 Personal profile of the respondents
- 4.2 Psychological profile of the respondents
- 4.3 Possession of smart gadgets
- 4.4 Trainings attended on ICTs
- 4.5 Sources of awareness about ICTs
- 4.6 Attitude towards ICTs
- 4.7 Access and frequency of use of ICTs
- 4.8 Purpose of accessing ICTs
- 4.9 Utilization of ICTs
- 4.10 E-Readiness of ICTs
- 4.11 Problems faced during usage of ICTs
- 4.12 Association of dependent variable with independent variables

4.1 Personal profile of the respondents

4.1.1 Age

The respondent's average age is found to be 39.87 years with a standard deviation of 7.99 years. From the Table 4.1, it is evident that out of 60 respondents, 49 (81.67%) respondents belonged to age group between 32 and 48 years, 6 (10%) belonged to age group more than 48 years and 5 (8.33%) belonged to age group below 32 years.

The similar findings are also found in the study conducted by Chavai *et al.* (2017).

Table 4.1: Distribution of respondents over age**(N=60)**

Category	Range	Frequency	Percentage	Mean = 39.87
Young	<32 years	5	8.33	
Medium	32-48 years	49	81.67	SD = 7.99
Old	>48 years	6	10.00	

4.1.2 Gender

Table 4.2 shows that majority (65%) of the working personnel in the selected agricultural institutions were male whereas 35 per cent were female. The findings are in line with the study conducted by Lakshmi *et al.* (2018).

Table 4.2: Distribution of respondents over gender**(N=60)**

Category	Frequency	Percentage
Male	39	65.00
Female	21	35.00

4.1.3 Educational qualification

As presented in Table 4.3, the investigation elucidated that 53.34 per cent of the respondents have completed their doctoral studies. It is evident because many respondents under the study are involved in teaching and research where doctorate degree holders are more preferred, 28.33 per cent of the respondents have completed their post-graduation and 11 per cent of the respondents were graduates. This finding is in agreement with study of Alabi (2016).

Table 4.3: Categorization of respondents over educational qualification**(N=60)**

Category	Frequency	Percentage
Graduate	11	18.33
Post Graduate	17	28.33
Doctorate	32	53.34

4.1.4 Job experience

From the Table 4.4, it is evident that 70 per cent of the respondents belonged to medium level of job experience ranging between 4-19 years whereas 15 per cent of respondents had high and low job experience each. This is because

majority of the respondents in the selected institutions were in the mid of their respective careers. Similar findings were presented by Khamoushi and Gupta (2015).

Table 4.4: Distribution of respondents over job experience

(N=60)

Category	Range	Frequency	Percentage	Mean = 11.6
Low	<4 years	9	15.00	SD = 7.82
Medium	4-19 years	42	70.00	
High	>19 years	9	15.00	

4.1.5 Area of specialization

From the data presented in Table 4.5, it could be seen that 41.67 per cent of the respondents were specialised in teaching, 20 per cent each were involved in extension and training and 18.33 per cent were involved in Research. This is because of respondents were selected from various institutions where their major job responsibility is not same in all the institutions. Since majority of respondents are from agriculture colleges, respondents under teaching category are more (25 out of 60) and similar findings were also reported by Lopokoyit *et al.* (2012).

Table 4.5: Distribution of respondents over area of specialization

(N=60)

Category	Frequency	Percentage
Extension	12	20.00
Teaching	25	41.67
Research	11	18.33
Training	12	20.00

4.2 Psychological characteristics of the respondents

4.2.1 Achievement motivation

In the Table 4.6 the respondents were categorized into high, medium and low categories where the range of the scores for each category was calculated based on the mean and standard deviation. Among 60 respondents, majority 68.33 per cent of them belonged to medium achievement motivation category having a score between 29 and 34 while 15.00 per cent and 16.67 per cent of respondents had low and high achievement motivation respectively. The reason for having most of the respondents under medium achievement motivation was that they were into some or the other service which ensured them of their jobs and continuous income irrespective of their performance. If the respondents were subjected to pressure of high

performance that would determine their salary or income then their level of motivation achievement would be high. Similar findings were reported by Gopika *et al.* (2015).

Table 4.6: Categorization of respondents based on achievement motivation (N=60)

Category	Range	Frequency	Percentage	Mean = 31.58 SD = 3.16
Low	<29	9	15.00	
Medium	29-34	41	68.33	
High	>34	10	16.67	

4.2.2 Innovation proneness

From the Table 4.7 it could be clearly divulged that 58.33 per cent of the respondents had medium level of innovation proneness and one-fifth (23.34%) of the respondents and 18.33 per cent of the respondents fall under high and low level categories respectively. The reason of medium innovation proneness of the respondents can be linked with their psychological ability to innovate any new technology irrespective of their pre-conceptions and fears about it. The younger age people are more expected to adopt any technological innovation faster than their senior colleagues in an organization. The middle age respondents may not consider it very important unless it is declared as an obligatory policy implication. Since many of the respondents belonged to middle age, the percent is high in medium level of innovation proneness.

Similar findings were reported by Chitra (2015).

Table 4.7: Categorization of respondents based on innovation proneness (N=60)

Category	Range	Frequency	Percentage	Mean = 29.58 SD = 2.51
Low	<27.07	11	18.33	
Medium	28-31	35	58.33	
High	>31	14	23.34	

4.2.3 Job performance

As it could be seen from Table 4.8, 86.67 per cent of the respondents showed medium level of job performance and remaining (13.33%) respondents belonged to low degree job performance, while none of the respondents were falling to high job performance category. The medium degree of job performance attributed to the type of works allotted at their workplace. It was reported during the data collection that most of the time the respondents were burdened with administrative works that

would leave them with less time for carrying out core extension activities. There by resulting in job dissatisfaction. Similar findings were also reported by Akoijam *et al.* (2018) while Debnath *et al.* (2014) and Olatunji *et al.* (2015) contradicted the same.

Table 4.8: Categorization of respondents based on job performance (N=60)

Category	Range	Frequency	Percentage	Mean = 40.80
Low	<36.05	8	13.33	SD = 4.75
Medium	37-45.5	52	86.67	
High	>45.55	0	0	

4.3 Possession of smart gadgets

It is evident from Table 4.9 that cent per cent (100%) respondents had possessed mobile phones. While 59 out of 60 members had smart phones and all the members having smart phones had internet connection to their respective smart phones. Majority (93.33%) of respondents had possessed personal computer or laptop among which 90 per cent of the respondents had internet connection to their respective computers/laptops. It can be generalized that since all of the respondents were Government employees they can afford both smart phones and laptops along with internet connection.

Table 4.9: Distribution of respondents over possession upon smart gadgets (N=60)

Smart gadgets	Frequency	Percentage
Mobile phone	60	100
Smart phone	59	98.33
Smart phone with internet	59	98.33
Personal Computer/laptop	56	93.33
Personal Computer/laptop with internet	54	90

4.4 Trainings attended on ICTs

As observed in Table 4.10 above, it can be understood that 66.67 per cent of the respondents have not attended any specific trainings related to ICTs. This may be because the respondents selected were mostly from the academic institutes whose primary job responsibility is teaching. Extension functionaries working at the farmer level would require more skills on the usage of ICTs. Similar findings were

reported by Agha *et al.*, (2018) while contradicted with the findings of Afzal *et al.* (2016).

**Table 4.10: Trainings attended on ICTs by respondents
(N=60)**

Trainings in ICTs	Frequency	Percentage
Yes	20	33.33
No	40	66.67

4.5 Sources of awareness about ICTs

As observed in Table 4.11, the various sources of information regarding ICTs has been displayed and it reveals that most of them reported office/institutions where they work as their primary source of information followed by friends and family members. Computer (56.67%), scanner (71.67%), printer (61.675), LCD projector (76.67%), Handy cam (50.00%), Teleconferencing (70.00%), Video conferencing (63.33%) and Fax (75.00%) were known through offices. Since most of these tools will be used for official communication, offices were reported as major source. Laptops and email (58.33%), internet (65.00%), Digital camera (55.00%), video camera (50.00%) and CD/DVD Player (48.33%) were reported as known from friends/colleagues. The ICT tools mentioned above can be used for both personal as well as official communication purposes and hence friends and colleagues constituted the major sources. Radio (76.67%), Television (80.00%), Mobile (55.00%) and Landline (60.00%) were reported to be known from family members since these tools are most commonly used at home. Similar findings were also reported by Raksha (2015).

Table 4.11: Distribution of respondents over sources of awareness about ICTs

(N=60)

S.N.	Source of information ICTS	Family Members	Through Newspaper	Office / Institution	Trainings	Summer / winter camp	Internet	Friends / Colleagues
1	Computer	13 (21.67)	6 (10.00)	34 (56.67)	4 (6.67)	0 (0.00)	10 (16.67)	33 (55.00)
2	Laptops	12 (20.00)	7 (11.67)	29 (48.33)	2 (3.33)	0 (0.00)	12 (20.00)	35 (58.33)
3	Internet	8 (13.33)	9 (15.00)	28 (46.67)	4 (6.67)	0 (0.00)	13 (21.67)	39 (65.00)
4	e-mail	9 (15.00)	4 (6.67)	28 (46.67)	3 (5.00)	0 (0.00)	12 (20.00)	35 (58.33)
5	Scanner	3 (5.00)	0 (0.00)	43 (71.67)	1 (1.67)	0 (0.00)	5 (8.33)	26 (43.33)
6	Printer	9 (15.00)	2 (3.33)	37 (61.67)	2 (3.33)	0 (0.00)	6 (10.00)	24 (40.00)
7	Radio	46 (76.67)	0 (0.00)	5 (8.33)	0 (0.00)	0 (0.00)	3 (5.00)	18 (30.00)
8	Television/LC Ds	48 (80.00)	3 (5.00)	5 (8.33)	0 (0.00)	0 (0.00)	3 (5.00)	21 (35.00)
9	LCD Projector	6 (10.00)	1 (1.67)	46 (76.67)	2 (3.33)	0 (0.00)	7 (11.67)	19 (31.67)
10	Digital Camera	15 (25.00)	2 (3.33)	27 (45.00)	0 (0.00)	0 (0.00)	8 (13.33)	33 (55.00)
11	Video camera	16 (26.67)	4 (6.67)	23 (38.33)	0 (0.00)	0 (0.00)	8 (13.33)	30 (50.00)
12	Handy cam	13 (21.67)	0 (0.00)	30 (50.00)	0 (0.00)	0 (0.00)	9 (15.00)	29 (48.33)
13	Tele conferencing	6 (10.00)	3 (5.00)	42 (70.00)	0 (0.00)	0 (0.00)	10 (16.67)	19 (31.67)
14	Video conferencing	5 (8.33)	3 (5.00)	38 (63.33)	1 (1.67)	0 (0.00)	12 (20.00)	23 (38.33)
15	CD/DVD Player	28 (46.67)	4 (6.67)	16 (26.67)	2 (3.33)	0 (0.00)	4 (6.67)	29 (48.33)
16	Mobile	33 (55.00)	4 (6.67)	10 (16.67)	1 (1.67)	0 (0.00)	11 (18.33)	28 (46.67)
17	Fax	5 (8.33)	0 (0.00)	45 (75.00)	2 (3.33)	0 (0.00)	6 (10.00)	17 (28.33)
18	Landline	36 (60.00)	1 (1.67)	21 (35.00)	1 (1.67)	0 (0.00)	3 (5.00)	18 (30.00)
19	Technical support	10 (16.67)	0 (0.00)	32 (53.33)	4 (6.67)	1 (1.67)	11 (18.33)	17 (28.33)

*Figures in parentheses indicate percentage

4.6 Attitude towards ICTs

Regarding the attitude of extension personnel towards ICTs, scale developed by Raksha (2014) has been used with partial modification. 20 statements have been used for final assessment. The statements have been measured on a five point continuum of Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (DA) and Strongly Disagree (SDA) with a score of 5,4,3,2 and 1 for positive statements and 1,2,3,4 and 5 for negative statements. According to the scores for each statement, except Statement no.17 all the other statements from 1 to 20 were agreed by majority of the respondents. Statement 17 says "ICTs alone cannot solve all the problems related to agriculture" for which 46.67 per cent of the respondents strongly agreed indicating that ICTs are supplementary technologies to the existing traditional methods. The statement 'I am comfortable to use ICT in technology dissemination' was agreed by 58.33 per cent of respondents, while 16.67 per cent strongly agreed, whereas 11.67 per cent were undecided, one tenth (10%) of the respondents disagreed and only 3.33 per cent of the respondents strongly disagreed upon the statement.

Table 4.12: Distribution of responses of the extension personnel towards attitude statements

(N=60)

Sl. No.	Statements	Response Categories				
		SA	A	UD	DA	SDA
1.	ICTs are best possible bridges between research system and farming system to reduce the research dissemination gap.	20 (33.33)	31 (51.67)	1 (1.67)	3 (5.00)	5 (8.33)
2.	ICTs reduce the trainings and demonstrations cost.	14 (23.33)	40 (66.67)	4 (6.67)	0 (0.00)	2 (3.33)
3.	ICTs reduce face to face contacts between extension personnel and farmers.	12 (20.00)	27 (45.00)	5 (8.33)	11 (18.33)	5 (8.33)
4.	ICTs demands more time and creativity to develop qualitative content for ICTs in agriculture.	18 (30.00)	28 (46.67)	7 (11.67)	7 (11.67)	0 (0.00)
5.	ICTs involve more cost for installation and maintenance.	21 (35.00)	26 (43.33)	5 (8.33)	7 (11.67)	1 (1.67)
6.	ICTs require constant updates of content in local language	32 (53.33)	24 (40.00)	4 (6.67)	0 (0.00)	0 (0.00)
7.	ICTs use creates problems to those extension personnel who lack knowledge and inexperience with online technologies.	17 (28.33)	35 (58.33)	3 (5.00)	4 (6.67)	1 (1.67)
8.	ICTs may replace the traditional extension methods in agriculture in near future.	13 (21.67)	36 (60.00)	5 (8.33)	3 (5.00)	3 (5.00)
9.	Through the use of ICTs for dissemination of agricultural technologies, more numbers of farmers, scientists and expert can interact at the same time.	18 (30.00)	34 (56.67)	5 (8.33)	1 (1.67)	2 (3.33)
10.	With the use of ICTs, working ability and capacity of the agricultural extension personnel can be upgraded.	22 (36.67)	33 (55.00)	2 (3.33)	3 (5.00)	0 (0.00)
11.	ICTs are more profitable and potentially faster tools to remote and diversified areas where agricultural extension services are not easily and frequently available.	14 (23.33)	32 (53.33)	5 (8.33)	6 (10.00)	3 (5.00)
12.	Transferring relevant information through ICT is not an easy task.	7 (11.67)	30 (50.00)	7 (11.67)	13 (21.67)	3 (5.00)
13.	ICTs based extension services are better alternative to present and future agricultural extension system.	12 (20.00)	29 (48.33)	15 (25.00)	4 (6.67)	0 (0.00)

14.	Modern ICTs applications could change the present way of functioning of researchers, experts, extension agents and farmers in agriculture.	11 (18.33)	39 (65.00)	6 (10.00)	2 (3.33)	2 (3.33)
15.	Feedback is fast through ICTs than traditional methods.	14 (23.33)	40 (66.67)	2 (3.33)	4 (6.67)	0 (0.00)
16.	Existing ICTs infrastructure is not enough to meet the needs of the intended users.	19 (31.67)	31 (51.67)	3 (5.00)	7 (11.67)	0 (0.00)
17.	ICTs alone cannot solve all the problems related to agriculture.	28 (46.67)	23 (38.33)	0 (0.00)	7 (11.67)	2 (3.33)
18.	With the help of ICTs, a new skilled and knowledge society can be developed.	14 (23.33)	36 (60.00)	5 (8.33)	2 (3.33)	3 (5.00)
19.	Access to information at doorstep through ICTs is really a boon to agriculture.	9 (15.00)	42 (70.00)	5 (8.33)	2 (3.33)	2 (3.33)
20.	I am comfortable to use ICT in technology dissemination.	10 (16.67)	35 (58.33)	7 (11.67)	6 (10.00)	2 (3.33)

*(**SA**: Strongly Agree, **A**: Agree, **UD**: Undecided, **DA**: Dis-agree, **SDA**: Strongly Disagree),
 Figures in parentheses indicate percentage

Based on the statements and their scores, the aggregate score for attitude was calculated and categorised into five categories as given in Table 4.13. We can see that 83.33 per cent of the respondents reported to have favourable attitude towards the use of ICTs for agricultural extension activities. None of the respondents had unfavourable attitude while 10 per cent of them reported to have neutral attitude and very negligible of 1.67 per cent reported to have highly favourable attitude towards the use of ICTs. Similar findings were also reported by Kabir and Roy (2015) and Afzal *et al.* (2016), however Sadegh *et al.* (2016) reported contradictory to the findings.

Table 4.13: Categorization of respondents upon overall attitude towards ICTs (N=60)

Attitude	Range	Frequency	Percentage
Highly unfavourable	0-20	0	0
Unfavourable	21-40	0	0
Neutral	41-60	6	10
Favourable	61-80	53	88.33
Highly favourable	81-100	1	1.67
Total		60	100

4.7 Access and frequency of use of ICTs

The accessibility and frequency of use of ICTs by the respondents is given in the Table 4.14. The ICT resources were asked for availability, if available whether in use or not and how frequently as daily, weekly twice, fortnightly and less than fortnightly. It can be observed that cent per cent of the respondents possessed mobile and laptops with Internet and printer facility. Of them 88.33 per cent said they used laptops daily, 96.49 per cent used internet daily, 90 per cent used mobiles daily and 86.67 per cent used printer daily. 98.33 per cent possessed computers, 90 per cent possessed email, 95 per cent possessed scanner, 93.33 per cent possessed LCD Projector, 85 per cent possessed digital camera, 78.33 per cent possessed video camera, 61.67 per cent possessed handy cam, 48.33 per cent possessed tele conferencing, 55 per cent possessed CD/DVD player, 51.76 per cent possessed video conferencing, 53.33 per cent availed fax, 50 per cent used landline and 23.33 per cent possessed radio. Cent per cent of the respondents reported to use the ICT resources possessed by them however 96.67 per cent and 96.88 per cent reported to use landline and fax while 92.86 per cent reported to use radio. Majority of the respondents reported to use the ICTs daily, 36.36 per cent used CD/DVD player weekly, 29.79 per cent, 40.54 per cent and 65.52 per cent reported to use video camera, Handy cam and

landline fortnightly. 70.97 per cent, 55.17 per cent, 51.61 per cent and 46.15 per cent of them reported to use fax, tele conferencing, video conferencing and radio less than once in fortnight respectively.

Table 4.14: Distribution of respondents upon access and frequency of use (N=60)

Sl. No	ICTs resources	Availabl e	If availabl e, in use	If Yes, Frequency			
		Yes	Yes	Daily	Weekl y Twice	Fortnight ly	Less than Fortnight ly
1.	Computer	59 (98.33)	59 (100.00)	53 (89.83)	6 (10.17)	0 (0.00)	0 (0.00)
2.	Laptops	60 (100.00)	60 (100.00)	53 (88.33)	7 (11.67)	0 (0.00)	0 (0.00)
3.	Internet	60 (100.00)	57 (95.00)	55 (96.49)	2 (3.51)	0 (0.00)	0 (0.00)
4.	e-mail	54 (90.00)	54 (100.00)	45 (83.33)	3 (5.56)	5 (9.26)	1 (1.85)
5.	Scanner	57 (95.00)	57 (100.00)	30 (52.63)	14 (24.56)	5 (8.77)	8 (14.04)
6.	Printer	60 (100.00)	60 (100.00)	52 (86.67)	6 (10.00)	0 (0.00)	2 (3.33)
7.	Radio	14 (23.33)	13 (92.86)	2 (15.38)	1 (7.69)	4 (30.77)	6 (46.15)
8.	Television/ LCDs	24 (40.00)	24 (100.00)	10 (41.67)	7 (29.17)	3 (12.50)	4 (16.67)
9.	LCD Projector	56 (93.33)	56 (100.00)	29 (51.76)	17 (30.36)	3 (5.36)	7 (12.50)
10	Digital Camera	51 (85.00)	51 (100.00)	21 (41.18)	9 (17.65)	7 (13.73)	14 (27.45)
11	Video camera	47 (78.33)	47 (100.00)	12 (25.53)	5 (10.64)	14 (29.79)	16 (51.61)
12	Handy cam	37 (61.67)	37 (100.00)	7 (18.92)	3 (8.11)	15 (40.54)	12 (32.43)
13	Tele conferencin g	29 (48.33)	29 (100.00)	0 (0.00)	5 (17.24)	8 (27.59)	16 (55.17)
14	Video conferencin g	31 (51.67)	31 (100.00)	0 (0.00)	1 (3.23)	14 (45.16)	16 (51.61)
15	CD/DVD Player	33 (55.00)	33 (100.00)	8 (24.24)	12 (36.36)	4 (12.12)	9 (27.27)
16	Mobile	60 (100.00)	60 (100.00)	54 (90.00)	0 (0.00)	6 (10.00)	0 (0.00)
17	Fax	32 (53.33)	31 (96.88)	1 (3.23)	1 (3.23)	7 (22.58)	22 (70.97)
18	Landline	30 (50.00)	29 (96.67)	4 (13.79)	2 (6.90)	19 (65.52)	4 (13.79)

*Figures in parentheses indicate percentage

Based on the results obtained in Table 4.14, an overall score for the access to ICTs was calculated and categorised into low (16-22), medium (23-29) and high (30-36) respectively. It was seen from Table 4.15 that 60 per cent of the respondents had high access to ICTs. This is because most of the respondents were from the CPGSAS, where use of computers, laptops, internet and e-mail, LCD projectors etc. is regularly used. Similar findings were reported by Ezeh (2013) and partial similarity with Sumi (2017).

Table 4.15: Distribution of respondents upon overall access to ICTs (N=60)

Category	Range	Frequency	Percentage
Low	16-22	0	0
Medium	23-29	24	40
High	30-36	36	60

4.8 Purpose of accessing ICTs

The purpose of accessing ICTs is described in Table 4.16 in which five purposes have been identified and responses on a 3 point continuum as frequently, rarely and poor were used. Cent per cent of the respondents reported that they accessed ICTs for knowledge, 91.67 per cent of them for storing data/information, 81.67 per cent of them for processing and analysing data/information, 90 per cent for networking with other organizations through social networking sites like gmail, twitter, facebook etc. and 73.34 per cent of them for sharing and disseminating information to others. The findings were in conformity with that of Sulibhavimath and Sharma (2018).

Table 4.16: Distribution of respondents over purpose of accessing ICTs
(N=60)

Sl. No.	Purpose	Frequently	Rarely	Never
1.	For accessing knowledge	60 (100.00)	0 (0.00)	0 (0.00)
2.	For storing data/information	55 (91.67)	5 (8.33)	0 (0.00)
3.	For processing and analysis of data/information	49 (81.67)	8 (13.33)	3 (5.00)
4.	For networking with other organizations	54 (90.00)	5 (8.33)	1 (1.67)
5.	For sharing and disseminating information	44 (73.34)	14 (23.33)	2 (3.33)

*Figures in parentheses indicate percentage

4.9 Utilization of ICTs

The pattern of utilization of ICTs has been elucidated in Table 4.17 below. Majority of the respondents reported the ICT tools as useful. The Audio-Visual aids Radio and television were primarily used for awareness (60.71% & 54.24%) and transfer of technology (55.36% and 50.85%) respectively. Among the telecommunication facilities, 56.90 per cent of the respondents reported utilization of telephone for planning, 54.23 per cent of them reported satellite communication for transfer of technology, 68.33 per cent utilized video conferencing for group meetings, and 58.33 per cent utilized tele conferencing for group meeting, group discussion and awareness respectively. 53.33 per cent of the respondents used digital camera for awareness and 58.33 per cent of them used video camera for transfer of technology respectively. Among the communication networks, 65 per cent of the respondents utilized internet for awareness, 59.32 per cent reported use of search engines for planning, 55 per cent used email for planning, and 32.72 per cent used intranet for planning. 53.33 per cent of them used spread sheets for planning. Community/farm radio (66.67%), knowledge portals (62.07%), mobile telephony (67.24%), landline (70.69%), Farmers Call Centre (68.97%), online social networking (65.52%), digital video transmission and expert system (50.00%), kiosks/common service centres (68.97%), LMS (57.63%) and GPS (65%) were used for transfer of technology.

Table 4.17: Distribution of respondents over utilization of ICTs

(N=60)

SI. No.	ICT Technologies	Useful	Purpose of Utility							
			P	I	E	GM	GD	FV	A	TOT
1.	Audio-visual systems									
1.1	Television sets	59 (98.33)	3 (5.08)	5 (8.47)	4 (6.78)	13 (22.03)	13 (22.03)	2 (3.39)	32 (54.24)	30 (50.85)
1.2	Radio	56 (93.33)	3 (5.36)	3 (5.36)	24 (42.86)	10 (17.86)	10 (17.86)	4 (7.14)	34 (60.71)	31 (55.36)
2.	Telecommunication facilities									
2.1	Telephone	58 (96.67)	33 (56.90)	26 (44.83)	26 (44.82)	9 (15.52)	29 (50.00)	23 (39.66)	30 (51.72)	28 (48.28)
2.2	Satellite tele communication	59 (98.33)	24 (40.68)	28 (47.46)	26 (44.07)	29 (49.15)	29 (49.15)	25 (42.37)	29 (49.15)	32 (54.23)
2.3	Video conferencing	60 (100.00)	6 (10.00)	27 (45.00)	26 (43.33)	41 (68.33)	39 (65.00)	6 (10.00)	29 (48.33)	14 (23.33)
2.4	Tele conferencing	60 (100.00)	8 (13.33)	20 (33.33)	30 (50.00)	35 (58.33)	35 (58.33)	12 (20.00)	35 (58.33)	25 (41.67)
2.5	Digital camera	60 (100.00)	7 (11.67)	9 (15.00)	26 (43.33)	10 (16.67)	11 (18.33)	36 (60.00)	32 (53.33)	31 (51.67)
2.6	Video camera	60 (100.00)	8 (13.33)	8 (13.33)	7 (11.67)	12 (20.00)	10 (16.67)	31 (51.67)	10 (16.67)	35 (58.33)

3.	Computer electronic/Communication networks									
3.1	Internet	60 (100.00)	35 (58.33)	31 (51.67)	30 (50.00)	28 (46.67)	30 (50.00)	5 (8.33)	39 (65.00)	37 (61.67)
3.2	Search engines	59 (98.33)	35 (59.32)	30 (50.85)	30 (50.85)	8 (13.56)	9 (15.25)	5 (8.47)	31 (52.54)	14 (23.73)
3.3	Email	60 (100.00)	33 (55.00)	28 (46.67)	29 (48.33)	12 (20.00)	8 (13.33)	2 (3.33)	12 (20.00)	14 (23.33)
3.4	Intranet	55 (91.67)	18 (32.72)	19 (34.55)	19 (34.55)	10 (18.18)	10 (18.18)	5 (9.09)	8 (14.55)	13 (23.64)
4.	Computer software									
4.1	Spread sheets	60 (100.00)	32 (53.33)	30 (50.85)	13 (21.67)	12 (20.00)	9 (15.00)	5 (8.33)	10 (16.67)	10 (16.67)
5.	Community radio/farm radio	60 (100.00)	10 (16.67)	25 (41.67)	9 (15.00)	15 (25.00)	10 (16.67)	10 (16.67)	39 (65.00)	40 (66.67)
6.	Statistical Package for Social System	60 (100.00)	27 (45.00)	8 (13.33)	30 (50.00)	3 (5.00)	3 (5.00)	1 (1.67)	3 (5.00)	10 (16.67)
7.	Specific knowledge portals (Rice doctor, Honey bee, RKMP, AGMARKNET, Digital mandi etc.)	58 (96.67)	12 (20.69)	22 (37.93)	2 (3.45)	5 (8.62)	5 (8.62)	5 (8.62)	31 (53.45)	36 (62.07)
8.	Mobile telephony	58 (96.67)	27 (46.55)	26 (44.83)	23 (39.66)	8 (13.79)	5 (8.62)	23 (39.66)	35 (60.34)	39 (67.24)
9.	Landline	58 (96.67)	8 (13.79)	7 (12.07)	5 (8.62)	10 (17.24)	3 (5.17)	2 (3.45)	34 (58.62)	41 (70.69)

10.	Farmers call centre	58 (96.67)	7 (12.07)	5 (8.62)	3 (5.17)	7 (12.07)	5 (8.62)	5 (8.62)	29 (50.00)	40 (68.97)
11.	Online social networking	58 (96.67)	9 (15.51)	4 (6.90)	4 (6.90)	8 (13.79)	5 (8.62)	2 (3.45)	33 (56.90)	38 (65.52)
12.	Digital video transmissions	60 (100.00)	9 (15.00)	7 (12.07)	6 (10.00)	7 (11.67)	5 (8.33)	0 (0.00)	29 (48.33)	30 (50.00)
13.	Expert database /Expert system	60 (100.00)	10 (16.67)	8 (13.33)	7 (11.67)	7 (11.67)	3 (5.00)	0 (0.00)	26 (43.33)	30 (50.00)
14.	Kiosks/Common Service Centres (CICs)	58 (96.67)	4 (6.90)	1 (1.72)	22 (37.93)	5 (8.62)	3 (5.17)	0 (0.00)	33 (56.90)	40 (68.97)
15.	Learning Management System (LMS)	59 (98.33)	29 (49.15)	26 (44.07)	26 (44.06)	5 (8.47)	5 (8.47)	1 (1.69)	28 (47.46)	34 (57.63)
16.	Global Positioning System (GPS) units/Geographical Information System	60 (100.00)	30 (50.00)	29 (48.33)	5 (8.33)	5 (8.33)	6 (10.00)	3 (5.00)	10 (16.67)	39 (65.00)
17.	Decision Support System	60 (100.00)	35 (58.33)	38 (63.33)	34 (56.67)	6 (10.00)	7 (11.67)	4 (6.67)	26 (43.33)	30 (50.00)

(Planning, I-Implementation, E-Evaluation, GM-Group Meeting, GD – Group Discussion, A- Awareness, TOT– Transfer of Technology);

*Figures in parentheses indicate percentage

4.10 E-Readiness

The level of e-readiness of the extension personnel has been assessed at two level viz., individual level and institutional level. The individual e-readiness (Table 4.18) was measured using statements on availability, accessibility and ability dimensions. In the ability dimensions basic computer skills, internet skills and software literacy skills were measured. Also the individual motivational factors were considered for the e-readiness. Majority of the respondents reported to have possessed ICT resources like computers, laptops etc. and were capable of using and operating them when required. On an average 40.55 per cent of the respondents agreed that they can access ICT tools as and when required at office. Regarding basic computer skills, 70 per cent reported that they had basic knowledge about computer functioning, while 63.33 per cent disagreed that they will not be able to carry out Microsoft application in emergency without any help. 60 per cent and 65 per cent of them reported that they are comfortable in using computer for attending online programmes and know how to use modern ICTs for communication. Regarding internet skills, 66.67 per cent of them reported that they can well communicate using online technologies in a safe and proper manner. 61.67 per cent reported that they can operate websites through internet explorer. 58.33 per cent reported that they have knowledge of online surveys and can use them, while 56.67 per cent reported to use video chatting and social networking sites. However, 26.67 per cent of them reported that they did not know how to send large files using specialized services like yousendit. Regarding software literacy applications, 51.67 per cent, 58.33 per cent and 41.67 per cent of them reported that they know how to modify, add, and delete content and assignments using an online Learning Management System. However, 35 per cent of the respondents disagreed that they did not know how to use file compression, can handle several applications at the same time and has undergone at least one course on ICTs respectively.

Regarding the motivational factors, 68.33 per cent of the respondents reported to remain motivated and 61.67 per cent reported that they would learn things by themselves without any formal training. 48.33 per cent and 45 per cent of the respondents reported that they can complete their work in spite of online and physical distractions.

Table 4.18: Responses of extension personnel to individual e-readiness statements (N=60)

Individual e-readiness						
Technology access						
Availability at personal and individual level						
SI No.	Statements	Response Categories				
		Yes		No		
1.	I have Personal computer/laptop with adequate and necessary software installed.	53 (83.33)		7 (11.67)		
2.	I have Internet facility in home and mobile as well.	58 (96.67)		2 (3.33)		
3.	I have smart phone with necessary information software installed and can operate as well.	59 (98.33)		1 (1.67)		
Accessibility						
		SA	A	UD	DA	SDA
1.	Each employee can access the ICTs available in the department as per need.	10 (16.67)	27 (45.00)	10 (16.67)	8 (13.33)	5 (8.33)
2.	Every employee has given personal computer/laptop for working hours in office with internet facility.	5 (8.33)	26 (43.33)	8 (13.33)	12 (20.00)	9 (15.00)
3.	Only technical personnel can access the ICTs available in the department.	6 (10.00)	20 (33.33)	6 (10.00)	25 (41.67)	3 (5.00)
Ability/Technology skills						
Basic computer skills						
		SA	A	UD	DA	SDA
1.	I have knowledge of the basic functions of computer hardware components (CPU and monitor) and its peripherals (printer, scanner, speaker, mouse etc.)	13 (21.67)	42 (70.00)	1 (1.67)	4 (6.67)	0 (0.00)
2.	I know the basic Microsoft windows operations and can do without any help except only in emergency.	0 (0.00)	2 (3.33)	3 (5.00)	38 (63.33)	17 (28.33)
3.	I am comfortable using a computer several times a week to participate in an online programme.	14 (23.33)	36 (60.00)	4 (6.67)	6 (10.00)	0 (0.00)
4.	I know how to use modern ICTs (videoconferencing, online sharing, mobile learning etc.)	12 (20.00)	39 (65.00)	4 (6.67)	5 (8.33)	0 (0.00)
Internet skills						
		SA	A	UD	DA	SDA
1.	I am able to communicate well with others using online technologies (e.g., email, chat etc.).	20 (33.33)	40 (66.67)	0 (0.00)	0 (0.00)	0 (0.00)
2.	I have an email id and use it properly and safely.	19 (31.67)	40 (66.67)	0 (0.00)	1 (1.67)	0 (0.00)
3.	I can open the websites through internet explorers.	16 (26.67)	37 (61.67)	0 (0.00)	3 (5.00)	4 (6.67)
4.	I have working knowledge of group mails (Google group), online file sharing with google doc and know	13 (21.67)	27 (45.00)	9 (15.00)	10 (16.67)	1 (1.67)

	well how to use discussion boards, chat tools etc.					
5.	I know the video chatting (skype, google duo etc.) for delivering lessons to intended users.	12 (20.00)	34 (56.67)	3 (5.00)	10 (16.67)	1 (1.67)
6.	I know the use of social networking sites (whatsapp, facebook, twitter etc.)	16 (26.67)	34 (56.67)	1 (1.67)	8 (13.33)	1 (1.67)
7.	I know how to send heavier files by using specialized services like yousendit etc.	12 (20.00)	14 (23.33)	16 (26.67)	16 (26.67)	2 (3.33)
8.	I have knowledge of online survey and I can use it.	13 (21.67)	35 (58.33)	6 (10.00)	5 (8.33)	1 (1.67)
9.	I know how to access an online library and other resource database.	15 (25.00)	33 (55.00)	6 (10.00)	5 (8.33)	1 (1.67)
Software literacy applications						
		SA	A	UD	DA	SDA
1.	I know how to use file compression.	12 (20.00)	31 (51.67)	11 (18.33)	5 (8.33)	1 (1.67)
2.	I able to have several applications opened at the same time and move easily between them.	14 (23.33)	35 (58.33)	5 (8.33)	5 (8.33)	1 (1.67)
3.	I have attended seminars / workshops related to online learning activities.	11 (18.33)	21 (35.00)	8 (13.33)	16 (26.67)	4 (6.67)
4.	I have done at least one course on ICTs and related aspects.	11 (18.33)	13 (21.67)	8 (13.33)	21 (35.00)	7 (11.67)
5.	I know how to modify, add, and delete content and assignments using an online Learning Management System.	10 (16.67)	25 (41.67)	8 (13.33)	15 (25.00)	2 (3.33)
Motivational factors						
		SA	A	UD	DA	SDA
1.	I think that I would be able to remain motivated.	15 (25.00)	41 (68.33)	3 (5.00)	0 (0.00)	1 (1.67)
2.	I think that I would be able to complete my work even when there are online distractions (e.g., friends sending emails or Websites to surf).	10 (16.67)	29 (48.33)	16 (26.67)	4 (6.67)	1 (1.67)
3.	I think that I would be able to complete my work even when there are distractions in my home or workplace (e.g. Television, children, guests and such).	8 (13.33)	27 (45.00)	13 (21.67)	7 (11.67)	5 (8.33)
4.	I am able to learn on my own without any formal training.	11 (18.33)	37 (61.67)	6 (10.00)	5 (8.33)	1 (1.67)
5.	I am not interested at all for e-learning.	2 (3.33)	7 (11.67)	14 (23.33)	25 (41.67)	12 (20.00)

*(**SA**: Strongly Agree, **A**: Agree, **UD**: Undecided, **DA**: Dis-agree, **SDA**: Strongly Disagree)

*Figures in parentheses indicate percentage

The institutional e-readiness (Table 4.19) is measured against administrative instructions and resource support. 63.33 per cent of the respondents agreed that computing is firmly integrated into the institution's culture. 56.67 per cent agreed that the institution is willing to accept ICT/e- learning as a mode for Teaching/Research/Extension and 48.33 per cent of them agreed that the institution is willing to employ or to assign an academically capable and/ or experienced faculty to oversee the implementation of the e-learning/ICT environment. 58.33 per cent of them reported that their working institutes had their own websites and 26.67 per cent agreed that the institution has its own e-security and ICT policy. 33.33 per cent of them disagreed that the institute has necessary system capacity and well-developed technical infrastructure to support the ICT and 28.33 per cent disagreed that the current technological infrastructure is adequate to build and/or sustain an ICT environment.. 43.33 per cent of them were not sure if the institution is willing to create a budget for implementing ICT/e-learning and financially ready to venture into ICT/e-learning and 35 per cent of them were not sure if the institution has adequate human resources to support an ICT/e-learning initiative.

Table 4.19: Responses of extension personnel to e-readiness statements

(N=60)

Institutional e-readiness						
Administrative policy/instructions/commitment						
Sl. No.		SA	A	UD	DA	SDA
1.	The institution is willing to employ or to assign an academically capable and/ or experienced faculty to oversee the implementation of the e-learning/ICT environment.	9 (15.00)	29 (48.33)	13 (21.67)	9 (15.00)	0 (0.00)
2.	The institution is willing to accept ICT/e- learning as a mode for Teaching/Research/Extension.	10 (16.67)	34 (56.67)	16 (26.67)	0 (0.00)	0 (0.00)
3.	Computing is firmly integrated into the institution's culture.	8 (13.33)	38 (63.33)	12 (20.00)	2 (3.33)	0 (0.00)
Resource Support(Technical, Financial, Human)						
		SA	A	UD	DA	SDA
1.	The institution is willing to create a budget for implementing ICT/e-learning and financially ready to venture into ICT/e-learning.	8 (13.33)	22 (36.67)	26 (43.33)	4 (6.67)	0 (0.00)
2.	The institution has adequate human resources to support an ICT/e-learning initiative.	11 (18.33)	13 (21.67)	21 (35.00)	15 (25.00)	0 (0.00)
3.	The current technological infrastructure is adequate to build and/or sustain an ICT environment.	11 (18.33)	16 (26.67)	12 (20.00)	17 (28.33)	4 (6.67)
4.	The institute has necessary system capacity and well-developed technical infrastructure to support the ICT.	8 (13.33)	14 (23.33)	17 (28.33)	20 (33.33)	1 (1.67)
5.	Institution has its own website, own designed programmes.	17 (28.33)	35 (58.33)	5 (8.33)	3 (5.00)	0 (0.00)
6.	Institution has its own e-security policy and own ICT policy.	9 (15.00)	16 (26.67)	16 (26.67)	15 (25.00)	4 (6.67)
7.	Institution has contact/liason with the local, regional and state level institution that has e-learning assisted extension services.	12 (20.00)	21 (35.00)	13 (21.67)	13 (21.67)	1 (1.67)

*(**SA**: Strongly Agree, **A**: Agree, **UD**: Undecided, **DA**: Dis-agree, **SDA**: Strongly Disagree)

*Figures in parentheses indicate percentage

Based on the findings in Table 4.19, an overall score for e-readiness of the respondents was calculated and categorised into low, medium and high with scores ranging between <116.95 and >156.81. It can be found in Table 4.20 that 76.67 per cent of the respondents had medium level of e-readiness, followed by 15 per cent with high e-readiness and 8.33 per cent with low e-readiness respectively. Table 4.21 indicates the contribution of each component towards total e-readiness. Similar findings were reported by Meera *et al.* (2010) and contradictory findings were reported by Mohamed and Mohamed (2015) and Olaolu *et al.* (2018).

Table 4.20: Overall e-readiness of respondents

(N=60)

Category	Range	Frequency	Percentage	Mean = 136.88
Low	<116.95	5	8.33	
Medium	117-156.81	46	76.67	SD = 19.93
High	>156.819	9	15	

Table 4.21: Component wise contribution towards total e-readiness

Sl. No.	Components of e-readiness	Score obtained	Total score	Percentage
1	Availability	347	360	96.38
2	Accessibility	574	750	76.53
3	Basic computer skills	972	1200	81.00
4	Internet skills	2100	2700	77.78
5	Software literary applications	1053	1500	70.20
6	Motivational factors	1055	1500	70.33
7	Institutional e-readiness	2112	3000	70.40

4.11 Problems faced during usage of ICTs

As it could be seen from the Table 4.22 one third (33.33%) of the respondents reported that they faced problem in using ICTs because of no assured supply in the institutions, followed by lack of availability of advanced softwares (26.67%). While one fourth (25%) of respondents opined that lack of expertise in ICTs in institution is causing problems when there is breakdown in the ICTs, whereas 23.33 per cent opined that the internet speed is low in the institutions. The management of institutions should consider these problems and should come out with possible solutions to all the mentioned problems and should make the using ICTs hassle free.

Table 4.22: Problems faced by respondents while using ICTs**(N=60)**

Sl. No.	Problems	Frequency	Percentage
1.	No assured power supply in the institution	20	33.33
2.	Lack of availability of advanced softwares	16	26.67
3.	Lack of expertise in ICTs	15	25.00
4.	Slow internet speed	14	23.33

4.12 Correlation between dependent variable with independent variables

In the present study the e-readiness is perceived as dependent variables while all the other variables are perceived as independent variables. The correlation between dependent and independent variables was found using Pearson correlation coefficient.

From the Table 4.23 it could be seen that the independent variable e-readiness had positively and significantly correlated with the dependent variables like gender, possession of smart gadgets, and purpose of accessing ICTs at five per cent level of significance.

It is also evident that the independent variables like attitude towards the use of ICTs, achievement motivation, innovation proneness, and job performance are found to be significant and had positive correlation with the dependent variable, e-readiness at 1 per cent level of precision. The reason may be the respondents had high access to ICTs and sources of ICTs through interpersonal contacts, moral commitment towards their job.

The independent variables age, education, major job responsibility, had seen showing negative correlation with the e-readiness, but they are found non-significant.

Experience, trainings attended on ICTs, sources of awareness about ICTs, utility of ICTs, and access to ICTs are some of the independent variables that are showing positive correlation with the dependent variable, but are found to be non-significant.

Table 4.22: Correlation between dependent variable and independent variables

Sl. No.	Independent Variables	Dependent Variable	Statistical Tool	“r” Value
1.	Age	e-Readiness	Pearson correlation coefficient	-0.008
2.	Gender			0.305*
3.	Education			-0.052
4.	Job experience			0.006
5.	Area of specialization			-0.049
6.	Possession of smart gadgets			0.284*
7.	Training attended on ICTs			0.008
8.	Sources of awareness about ICTs			0.105
9.	Attitude towards use of ICTs			0.564**
10.	Utility of ICTs			0.083
11.	Access to ICTs			0.077
12.	Purpose of accessing ICTs			0.285*
13.	Achievement motivation			0.334**
14.	Innovation proneness			0.348**
15.	Job performance			0.352**

(**1% level of significance; *5% level of significance)

Chapter 5

Summary and Conclusion

The progression of Information and Communication Technology (ICT) has transformed the world into an increasingly networked society, in which the development of any nation is dependent on the strength of their information system and connectivity with the world. ICTs had become the source of opportunities for economic and social development of the country (Mishra and Fatmi, 2015). The ICTs are forming palisade of the new generation of information gathering and dissemination. They are evolving very fast with the time, in that regard access to those advanced information and improvised communication technologies is very crucial for the sustainable agriculture development. Modern advanced technologies when they become relevant to the rural conditions can help in improving the communication, increase in the participation, dissemination of information and aids in sharing the knowledge and skills in rural areas. In a developing country like India, ICTs play crucial role in connecting different stake holders in agriculture. For the outreach of agricultural extension system, ICTs are the most favoured allies. Hence the ICT tools are greatly relevant for researchers, agricultural extension scientists and organizations. In agriculture ICTs fosters, dispense new and existing knowledge and information where it is communicated inside the agriculture, whereas information is crucial for agricultural and rural development as well as to foresee social and economic changes in the society (Swanson and Rajalahti, 2010).

E-Readiness is appraised as one of the main faces of the development for any country, it represents transformation of the society including movement from traditional relations and methods to modern ways of thinking or dealing with production, education and health (Wasim *et al.*, 2016). In agricultural extension in order to adopt and effectively implement the e-extension initiatives, the extension personnel should be imperatively e-ready so as to disseminate the new ideas or innovations or information or techniques at a faster rate. With this back drop a study was conducted to achieve the objectives such as to understand the accessibility and utility pattern of ICT tools by the extension personnel in agricultural institutions and to measure the level of e-readiness of the extension personnel in agricultural institutions.

5.1 Sampling procedure and data collection

The present study was conducted in Ri-Bhoi district of Meghalaya State during 2018-2019. Extension personnel working in eight agricultural institutions were chosen purposefully for the study. The eight agricultural institutions were College of Post Graduate Studies in Agricultural Sciences (CPGSAS), Umiam; Krishi Vigyan Kendra (KVK), Ri-Bhoi; College of Agriculture (COA), Kyrdemkulai; ICAR Research Complex for North Eastern Hill Region (ICAR RC for NEH Region); State Institute for Rural Development (SIRD), Umran; Agricultural Technology Management Agency (ATMA), Nongpoh; Rural Resource and Training Centre (RRTC), Umran; District Agriculture Office (DAO), Nongpoh. Data was collected from 60 respondents from selected 8 agricultural institutions. Data collection was done between 28/01/2019 and 10/04/2019. Twenty personnel from CPGSAS, seven personnel from ICAR RC for NEH, three personnel from ATMA, six personnel each from SIRD and DAO, seven personnel from KVK and DAO, and four personnel from COA, Kyrdemkulai provided the required information. The total sample constituted to 60. The data was scored, organised, tabulated and analysed using statistical tools/techniques like frequency, percentage, mean, standard deviation, class interval and Pearson correlation coefficient.

5.2 Salient findings

The important findings of present study are furnished below:

- More than three fourth (81.67%) of the respondents belonged to the middle age (32-48 years) group and 65 per cent of them were male respondents.
- Little above half (53.34%) of the respondents possessed doctorate degree followed by 28.33 per cent with post-graduation.
- Majority (70.00%) of respondents had medium job experience with a range of 4-19 years while 41.67 per cent of the respondents' major job responsibility was teaching.
- More than half (68.33%) of the respondents had medium level of achievement motivation, 58.33 per cent of them had medium level of innovativeness while 86.67 per cent of the respondents opined that their job performance was medium.
- All the respondents possessed mobile phones of which 98.33 per cent had smart phones with internet connection. 93.33 per cent of the respondents had a personal laptop/computer of which 90% of them had internet connection.

- Only 33.33 per cent were undergone trainings in ICTs while 66.67 per cent had not undergone training in ICTs.
- From the findings it could be seen that majority of the respondents confirmed that their workplace (office/institution) was their major source of information regarding awareness about ICTs, followed by friends.
- The attitude of the respondents towards ICTs revealed that 88.33 per cent of them had favourable attitude while 1.67 per cent had highly favourable attitude.
- Three fifth per cent (60.00%) of the respondents had high access to ICTs of which all of them expressed that the purpose of accessing ICTs was mainly for gaining knowledge, 91.67 per cent for storing information, 90 per cent for networking, 81.67 per cent to process and analyse data and 73.34 per cent for sharing information.
- Findings revealed that most of the ICT tools were used primarily for awareness and transfer of technology.
- Majority (76.67%) of the respondents had medium level of e-readiness, while 15 per cent had high level of e-readiness.
- Respondents opined that no assured power supply (33.33%) and lack of availability of advanced softwares (26.67%) as their major problems faced during ICTs.
- Independent variables gender, possession of smart gadgets, purpose of accessing ICTs and some other independent variables like attitude towards the use of ICTs, achievement motivation, innovativeness, job performance were positively correlated with the e-readiness at five per cent and one per cent level of significance respectively.

5.3 Suggestions/recommendations

- Since most of the respondents were found to have favourable attitude towards ICTs and reported to have lack of availability of required technical resources, it would be advisable for the institutions to plan for strategic implementation of advanced ICT facilities in their respective organizations and ensure full time hands on training to the employees so that effective use of these ICTs in favour of the farmers can be made.
- Though the respondents had favourable attitude, their level of e-readiness was found to be medium indicating the need to increase their e-readiness. This can

be achieved by motivating the employees to embed ICTs in their daily official routine and make them aware of latest technologies via trainings and skill based workshops in the organizations.

5.4 Conclusion

As the country is driving towards digitalization, ICTs play remarkable role in driving country towards digitalization. Since the extension personnel had favourable attitude towards the use of Information and Communication Technology (ICT) tools in agriculture, the institutions may have scope to take up innovative ICT based project which would result in higher efficiency in delivering extension services to the intended users. It may foster the job performance of the extension personnel in the agricultural institutions. Addressing the problems faced by the extension during usage of ICTs may result in better and better utilization of ICT tools and that would be encouraging to extension personnel to adopt latest technologies.

BIBLIOGRAPHY

- Adebayo, E.L. and Adesope, O.M. (2007). Awareness, access and usage of information and communication technologies between female researchers and extensionists. *Int. J. Edu. Dev. Inf. Commun. Technol.*, 3(1): 85-93.
- Adeel, A., Al-Subaiee, F.S., and Mirza, A.A. (2016). The attitude of agricultural extension workers towards the use of e-extension for ensuring sustainability in the Kingdom of Saudi Arabia. *Sustainability*, 8(1): 980-990.
- Afzal, A., Al-Subaiee, F., and Mirza, A. (2016). The attitudes of agricultural extension workers towards the use of e-extension for ensuring sustainability in the Kingdom of Saudi Arabia. *Sustainability*, 8(10): 980-990.
- Agha, R., Ghanghas, B.S., and Chahal, P.K. (2018). Use of information and communication technologies by extension personnel to disseminate agricultural information. *Int. Curr. Microbiol. App. Sci.*, 7(4): 1369-1376.
- Aguilar-Gallegos, N., Muñoz-Rodríguez, M., Santoyo-Cortés, H., Aguilar-Ávila, J., and Klerkx, L. (2015). Information networks that generate economic value: A study on clusters of adopters of new or improved technologies and practices among oil palm growers in Mexico. *Agric. Syst.*, 135: 122-132.
- Agwu, A. E. and Ogbonah, E. E. (2015). Access and use of information communication technologies by women staff of public extension service in the north central zone of Nigeria. *Agric. Inf. Worldwide*, 6(2): 18-24.
- Agwu, A.E., Uche-Mba, U.C., and Akinagbe, O.M. (2008). Use of information communication technologies (ICTs) among researchers, extension workers and farmers in Abia and Enugu States: Implications for a national agricultural extension policy on ICTs. *J. Agric. Ext.*, 12(1): 37-49.
- Ajayi, A.O., Alabi, O.S., and Akinsola, T.O. (2013). Knowledge and perception of extension agents on information and communication technologies (ICTs) use in extension service delivery in Ondo state in Nigeria. *African J. Agric. Res.*, 8(48): 6226-6233.
- Akoijam, R., Singh, M.K., Ram, D., Devi, D.M., and Singh, C.N. (2018). Performance of the agricultural extension personnel in the revitalize extension system in Manipur, India. *Int. Curr. Microbiol. App. Sci.*, 7(7): 2085-2089.
- Akpabio, I.A., Okon, D.P., and Inyang, E.B. (2007). Constraints affecting ICT utilization by agricultural extension officers in the Niger Delta, Nigeria. *J. Agric. Edu. Ext.*, 13(4): 263-272.
- Alabi, O.O. (2016). Adoption of information and communication technologies (ICTs) by agricultural science and extension teachers in Abuja. *Nigeria J. Agric. Educ.*, 57(1): 137-149.
- Anand, K. and Ravichandra, V. (2014). A scale to measure the attitude of extension personnel towards the ICT tools. *Trends in Biosciences*, 7(17): 2583-2585.
- Anurag, T.S., Punna, R. P., and Reddy, G.P. (2013). Interactive information disseminations system (IIDS): An alternative ICT model development under NAIP to meet the information need of the Indian farmers. *J. Ext. Edu.*, 15(1): 260.
- Apparap, G. (2007). Use of mass media by extension personal in dissemination of technology. *Agric. Ext. Rev.*, 12: 24-26.
- Babu, A. (2005). A comparative analysis of e-readiness and perception of information and communication technology beneficiaries in Kerala. M.Sc. Thesis, Submitted to University of Agricultural Sciences, (Bengaluru) India.

- Chavai, A.M., Patil, R.L., and Bhange, S.B. (2017). Utility pattern of ICT tools for transfer of agricultural technology by the extension personnel. *Contemp. Res. India.*, 7(2): 174-178.
- Chen, R.S and Tsai, C.C. (2005). Gender differences in Taiwan university students' towards the web-based learning. In: Looi, C.K., Jonassen, D., and Ikeda, M. (ed) Towards sustainable and scalable educational innovations informed by the learning sciences. IOS Press, Amsterdam, pp. 629-632.
- Chhachhar, A.R. and Salleh, M.H. (2013). The use of mobile phones among farmers for agriculture development. *Int. J. Sci. Res.*, 2(6): 95-98.
- Chitra, G. (2015). Strategies for capacity building of extension personnel for using information and communication technologies. Ph.D. Thesis, Submitted to Kerala Agricultural University, (Vellanikkara) India.
- Cullen, R. (2001). Addressing the digital divide. *Online Inf. Rev.*, 25(5): 311-320.
- Debnath, A., Saravanan, R., and Datta, J. (2014). Job competence and job performance of the extension personnel of the department of agriculture in Tripura state of North-East India. *Int. J. Soc. Sci.*, 3(2): 91-112.
- Devi, M.V. (2017). Usage of information and communication technologies by rural youth of Manipur. M.Sc. Thesis, Submitted to Central Agricultural University, (Imphal) India.
- Ezeh, A.N. (2013). Extension agents access and utilization of information and communication technology (ICT) in extension service delivery in south east Nigeria. *J. Agric. Ext. Rural Dev.*, 5(11): 266-276.
- Fathaigh, M. (2002). E-Learning and access: Some issues and implications. Proceedings of UACE Conference. Pp. 241-249, May 10, 2002. Birmingham, England.
- Franda, M. (2002). China and India online: Information, technology politics and diplomacy in the world's two largest nations. Rowman and Littlefield Publishers, Maryland, pp. 89-92.
- Frempong, F.A., Kwarteng, J., Agunga, R., and Zinnah, M.M. (2006). Challenges of infusing information and communication technologies in extension for agricultural and rural development in Ghana. *J. Ext. Syst.*, 22(2): 69-82.
- Ganesamoorthi, S., Gowda, K.N., and Gangadharappa, N.R. (2006). Development and testing of computer assisted instructional modules in agricultural extension education. Proceeding of 5th International Conference of the Asian Federation for Information Technology in Agriculture (AFITA). Pp. 111-120, November 9-11, 2006. Bangalore, India.
- Ganeshan, M., Karthikeyan, K., Prashanth, S., and Umadikar, J. (2013). Use of mobile multimedia agricultural advisory systems by Indian farmers: Results of a survey. *J. Agric. Ext. Rural. Dev.*, 5(4): 89-99.
- Gopika, M.H., Shivamurthy, M., Lakshminarayan, M.T., Subbareddy, P.N., and Banuprakash, K. G. (2015). Extent of participation in decision making by AHOs. *Mysore J. Agri. Sci.*, 49(4): 603-609.
- Haji, Z.H., Gholamreza, P.R., and Chizari, M. (2014). Factors influencing the use of and attitude of using information and communication technologies (ICTs) in agricultural extension, a study in the Isfahan province of Iran. *Int. J. Agric. Manag. Dev.*, 4(1): 51-60.
- Hashemi, Z.H., Rad, G.P., and Chizari, M. (2014). Factors influencing the use of and attitude of using Information and Communication Technologies (ICTs) in agricultural extension: A study in the Isfahan province of Iran. *Int. J. Agric. Manag. Dev.*, 4(1): 51-60.
- Hassan, M.A., Samah, B.A., Shaffril, H.A., and D'silva, J.L. (2011). Sociodemographic factors affecting attitude towards information and communication technology usage. *American J. App. Sci.*, 8(6): 547.
- Hedjazi, Y., Rezaee, R., and Zamani, N. (2006). Factors affecting the use of ICTs by Iranian agriculture extension specialists. *J. Ext. Systems.*, 22(1): 1.

- James, D.J. and Lakshminarayana, M.T. (2018). Attitude of agricultural extension functionaries towards information and communication technologies. *Mysore J. Agric. Sci.*, 51(4): 872-876.
- Kabir, K.H. (2015). Attitude and level of knowledge of farmers on ICT based farming. *Eur. Academic Res.*, 2(10): 13177-13196.
- Kabir, K.H. And Roy, D. (2015). Preferences of ICT tools by the upazila agriculture officers (UAOs) for information exchange in Bangladesh. *Agric. For. Fish.*, 4(2): 59-65.
- Karuna, S.E. and Sandhya, S.N. (2009). Information communication technology need assessment of agricultural professionals working in krishi vigyan kendras in Andhra Pradesh. *J. Commun. Stud.*, 28(1): 24-35.
- Khamoushi, S. and Gupta, J. (2015). Factors affecting familiarity and usage of information and communication technologies by agricultural extension scientists in north India. *J. App. Sci. Res.*, 11(5): 50-56.
- Kiran, T.R. (2007). Perception of organizational climate by scientists of UAS, Dharwad. M.Sc. Thesis, Submitted to University of Agricultural Sciences, (Dharwad) India.
- Kumar, G.P. (2008). Information and communication technologies enabled agricultural extension systems in Andhra Pradesh-A critical analysis. Ph. D. Thesis, Submitted to Acharya N.G. Ranga Agricultural University, (Hyderabad) India.
- Kumar, R. and Kaur, A. (2005). Internet and its use in the engineering colleges of Punjab, India: A case study. *Webology*, 2(4): 1-22.
- Kumar, S. and Gupta, S.K. (2017). E-Readiness: a state of preparedness to participate in the digital economy. *Agric. Int.*, 4(2): 42-45.
- Lakshmi, K. B. and Purnima, K. S. (2018). e-Readiness of extension functionaries of southern states of India in agricultural technology dissemination. *Indian Res. J. Ext. Educ.*, 18(4): 7-11.
- Lakshmi, K.B., Purnima, K.S., and Rani, B.J. (2018). Assessment of e-Readiness of extension functionaries of southern states of India in agricultural technology dissemination. *Indian Res. J. Ext. Educ.*, 18(2): 31-35.
- Lopokoityit, M.C., Ongango, C., Kibett, J.K., and Langat, B.K. (2012). Human resource development in agriculture extension and advisory services in Kenya. Eighth Africa Farm Management Association Congress. Pp. 371-388, November 25-29, 2012. Nairobi, Kenya.
- Mabe, L.K. and Oledede, O.I. (2012). Awareness level of use of information and communication technologies tools among extension officers in the North-West Province, South Africa. *Life Sci. J.*, 9(3): 57-62.
- Meena, M.S., Singh, K.M., Singh, R.K.P. (2012). ICT-enabled extension in agriculture sector: Opportunities and challenges in climate change situation. In: Singh, K.M. and Meena, M.S. (ed) ICT for agricultural development under changing climate. Narendra Publishing House, New Delhi, pp. 29-38.
- Meenakshi, A. (2003). An evaluation of agricultural market information system and its impact on the farm economy of Shimoga district of Karnataka state. M.Sc. Thesis, Submitted to University of Agricultural Sciences, (Bangalore), India.
- Meera, S.N., Sain, M., and SSP, J. (2010). Critical analysis of e-learning opportunities and e-readiness in the public extension system: Empirical evidence from Tamil Nadu. *J. Glob. Commun.*, 3(2): 11-18.
- Mishra, P. (2010). Profile of extension teachers. *J. Extn. Edu.*, 22(1): 4341-4545.
- Mishra, U. and Fatmi, S.N. (2015). e-Readiness of India with reference to national e-governance plan. *Int. J. Comput. App.*, 123(8): 21-26.
- Mohamed, F.S.A. and Mohamed, M.M.A. (2015). Measuring electronic readiness of extension personnel in Assiut Governorate. *Alex. Sci. Exch. J.*, 36(2): 163-168.

- Mohan, B. (2010). A study on job performance and job satisfaction of assistant agricultural officers in Northern districts of Karnataka. M.Sc. Thesis, Submitted to University of Agricultural Sciences, (Dharwad) India.
- Moulik, T. K. (1965). A study of the predictive value of some factors of adoption of nitrogenous fertilizers and the influence of sources of information on adoption behavior. Ph.D. Thesis, submitted to IARI, (New Delhi) India.
- Nagalakshmi, C. and Narayanaswamy, B.K. (2009). Profile of Raitha Samparka Kendras in Bangalore rural and urban districts for information communication technology application. *Mysore J. Agri. Sci.*, 43(3): 544-547.
- Nagalakshmi, C. and Swamy, B.K.N. (2011). Perception, awareness, attitude and knowledge of extension personnel about information communication technologies. *Mysore J. Agric. Sci.*, 45(2): 421-426.
- Nagalakshmi, C. (2008). Integrating ICT with multiple functions for agriculture development. M.Sc. Thesis, Submitted to University of Agricultural Sciences, (Bengaluru) India.
- Nagasree, K., Ravishankar, K., Dixit, S., Venkateshwarlu, B., and Jesudasan, V. (2008). Knowledge management through ICT tool for livelihood enhancement in semi-arid regions in India. Proceeding of National Seminar on Futuristic Agricultural Extension for Livelihood Improvement and Sustainable Development. Pp. 247-251, January 19-21, 2008. Hyderabad, India.
- Nongtdu, G., Bordoloi, R., Saravanan, R., Singh, R., and Singh, N.U. (2012). Training needs of agricultural extension personnel in Meghalaya. *Indian J. Hill Farming*, 25(1): 1-8.
- Okello, Juma, J., Okello R.M., and Adera, O.E. (2010). Awareness and the use of mobile phones for market linkage by small holder farmers in Kenya. In: B.M. Maumbe, (ed) e-Agriculture and e- Government for global policy development: Implications and future direction. Hershey: Information science reference: 1-18. <http://www.igi-global.com/chapter/awareness-use-mobile-phones-market/38139>. Accessed 22 August 2018.
- Olajide, B.R. and Uwaya, E.C. (2013). Technical, organizational and regulatory constraints to the use of information communication technologies (ICTS) infrastructure for agricultural extension delivery in Edo state, Nigeria. *Nigerian J. Rural. Sociol.*, 14(1): 60-67.
- Olaolu, M.O., Agwu, E.A., Ivande, P.D., and Olaolu, T.A. (2018). e-Readiness of public extension personnel for service delivery in Benue State, Nigeria. *J. Agric. Ext.*, 22(2): 110-124.
- Olatunji, S.O., Onumadu, F.N., and Ifeanyi-Obi, C.C. (2015). Job performance and job satisfaction of agricultural extension agents in rivers state agricultural development project. *J. Agric. Vet. Sci.*, 8(1): 50-55.
- Pandey, B., Dhasmana, S., and Kataria, M. (2015). Knowledge and use of ICT among youth: a study of Hisar district. *Int. Conference on recent Res. Dev. Environ. Soc. Sci. Hum.:* 148-163.
- Parida, S. (2010). Utilization of information and communication technology by staff and students in universities. M.Sc. Thesis, Submitted to University of Agricultural Sciences, (Dharwad) India.
- Prodhon, F.A. and Afrad, M.S.I. (2014). Knowledge and perception of extension workers towards ICT utilization in agricultural extension service delivery in Gazipur district of Bangladesh. *Int. J. Agric. Res. Innov. & Tech.*, 4 (2): 46-52.
- Raghava, N.V. and Punnarao, P. (2014). ICT use behaviour of scientists of krishi vigyan kendras. *J. Commun. Stud.*, 32(1): 3-12
- Ragul, M.G., Patel, V.T., Patel, J.K., and Arnab, B. (2016). Utility pattern of ICT tools for transfer of technology. *Int. J. Agric. Sci.*, 8(26): 1524-1526.
- Rai, A. (2014). A study on e-readiness of krishi vigyan kendra functionaries in Uttar Pradesh. Ph.D. Thesis, Submitted to Banaras Hindu University, (Varanasi) India.

- Rajashekar, G. and Sandhya, S.N. (2011). ICTs and agriculture knowledge dissemination: A tool used by NGOs of Andhra Pradesh. *J. Commun. Stud.*, 29(2): 34-39.
- Raksha, (2014). A study on information and communication technologies in agricultural extension system in Andhra Pradesh. Ph.D. Thesis, Submitted to Acharya N.G. Ranga Agricultural University, (Hyderabad) India.
- Raksha, I., Meera, S.N., and Kumar, V. (2016). e-Readiness in agricultural extension system. *Indian Res. J. Ext. Educ.*, 15(2): 77-81.
- Raksha, I., Sreenivasa, R., and Meera, S.N. (2014). Attitude of the agricultural extension personnel towards use of information technologies in field work. *J. Commun. Stud.*, 22(1): 3-11.
- Raksha, I., Sreenivasa, R., and Meera, S.N. (2015 a). Determinants of ICTs in agricultural extension system. *Indian Res. J. Ext. Edu.*, 15 (1): 56-59.
- Raksha, I., Sreenivasa, R., and Meera, S.N. (2015 b). e-Readiness of agricultural extension personnel with the use of ICTs in agricultural extension systems. *J. Ext. Sys.*, 31(2): 39-42.
- Rani, G.R. (1985). Scientific productivity of agricultural scientists – An activity analysis approach. Ph.D. Thesis, Submitted to Acharya N.G. Ranga Agricultural University, (Hyderabad) India.
- Rezaei, H.D., Safa, M., and Rajaeepour, S. (2010). The effect of directive and participative leadership style on employees' commitment to service quality. *Int. Bull. Bus. Admin.*, 9(1): 31-42.
- Rogers, E . M and Svenning L. (1969). Modernisation among peasants the impact of communication. Holt Rienhar and Winston Inc. New York, pp. 254-258.
- Sadegh, M.A., Zadehb, M.M., and Nastis, S.A. (2016). Agricultural experts' attitude towards precision agriculture: Evidence from Guilan agricultural organization, Northern Iran. *Info. Process. Agric.*, 3(3): 183–189
- Salau, E.S. and Saingbe, N.D. (2008). Access and utilization of information and communication technologies among agricultural researchers and extension workers in selected institutions in Nasarawa state of Nigeria, *Prod. Agric. Technol. J.*, 4 (2): 1-11.
- Salleh, H., Musa, A.H., Bahama, A.S., Narimah, I., and Hayrol, A.M.S. (2008). Use of information and communication technology among agri-based entrepreneurs in Malaysia. World conference on agricultural information and IT. University of Tokyo, Japan, pp. 753-766.
- Sandhu, H.S., Singh, G., and Grover, J. (2012). Analysis of kisan mobile advisory service in south western Punjab, *J. Krishi Vigyan Kendra*, 1(1): 1-4.
- Seetharam. (2010). Impact of information technology on society: Vishakapatnam in India as a case study. *Indian J. Sci. Technol.*, 3(4): 475-482.
- Shankaraiah, N. (2011). Attitude of farmers and scientists towards technology dissemination through mobile message service. M.Sc. Thesis, Submitted to University of Agricultural Sciences, (Bengaluru) India.
- Shankaraiah, N. and Swamy, N.B.K. (2012). Attitude of farmers and scientists towards dissemination of technologies through mobile message service (MMS). *Trop. Agric. Res.*, 24(1): 31-41.
- Shekh, A.M. and Patel, A. (2012). A case of ICT based extension: e-Krishi kiran. *J. Glob. Commun.*, 23(2): 52-56.
- Singh, R.K.J., Devi, T.M., and Raychaudhury, A. (2009). Use of Internet based eResources at Manipur university: A Survey. *Annuals Libr. Inf. Stud.*, 56(3): 52-57.
- Singh, S. (2012). Application of mobile phone in agro-advisory services. 10th International Conference on Extension Education in the Perspective of Advances in National Resources Management in Agriculture. Pp. 87-90, January 19-21, 2008. Bikaner, India.

- Sireesha, P., Rao, B.S., and Thammiraju, D. (2014). Constraints encountered in the utilization of information and communication technology (ICT) tools by various animal husbandry organizations in Andhra Pradesh. *Int. J. Innov. Res. Sci. Eng. Technol.*, 3(6): 13693-13701.
- Sridhara, G.M. (2005). Impact of new information and communication technology on productivity of agricultural scientists. M.Sc. Thesis, Indian Agricultural Research Institute, New Delhi (India).
- Subash, S., Kadian, K.S., and Kumar, R.S. (2013). The perceived constraints and suggestions on internet use by the students of a national institute. *J. Glob. Commun.*, 6(1): 40-43.
- Sulibhavimath, A. and Sharma, P. (2018). Extent of use of information and communication technology by extension personnel of KVKs. *J. Pharmacognosy Phytochemistry*, 7(3): 3628-3631.
- Sumi, D. (2017). Usage of ICT in agriculture by the farmers of and extension personnel in Dimapur district of Nagaland. M. Sc. Thesis, Submitted to the Central Agricultural University, (Imphal) India.
- Sunil, A., Singh, D.K., and Singh, S. (2009). Utilization pattern of mass media and other sources of information by change agents. *J. Commun. Stud.*, 28(1): 11-18.
- Swanson, B.E. and Rajalahti, R. (2010). Strengthening agricultural extension and advisory systems: procedures for assessing, transforming and evaluating extension systems. The World Bank, Washington. Pp. 98-127.
- Tanko, L., Adeniji, O.B., and Nwachukwu, H. (2013). Evaluation of the access to and utilization of information communication technology (ICT) facilities among extension officers in Shiroro LGA, Niger state, Nigeria. *J. Agric. Ext. Rural Dev.*, 5(1): 8-13.
- Tayade, A., Chinchmalatpure, U.R., and Supe, S.V. (2011). Information and communication technology used by the scientists in Krishi Vigyan Kendra and regional research centre. *J. Glob. Commun.*, 4(1): 16-26.
- Thanuskodi, S. (2011). Internet use by researchers: A Study of Annamalai University, Annamalainagar, *Library Philosophy and Practice*. https://www.researchgate.net/profile/Thanuskodi_Shanmugam2/publication/268266302_Internet_Use_by_Researchers_A_Study_of_Annamalai_University_Annamalainagar/links/5bd0503e92851c1816bcda17/Internet-Use-by-Researchers-A-Study-of-Annamalai-University-Annamalainagar.pdf. Accessed 10 March 2019.
- Thippeswamaiah, J.M. (2011). A study on job performance and job satisfaction of subject matter specialists working under NAEP, Karnataka. M.Sc. Thesis, Submitted to University of Agricultural Sciences, (Dharwad) India.
- Thurstone, L.L. (1946). Comment. *American J. Soci.*, 52(1): 39-50.
- Verma, S.R., Sharma, F.L., Chayal, K., and Kaushik, M.K. (2012). Attitude of extension personnel towards applications of information and communication technologies in agriculture. *Rajasthan J. Ext. Educ.*, 20: 102-107.
- Wasim, J., Mehra, R., and Khan, I.A. (2016). e-Readiness assessment: A standard to uplift digital India program. *Int. J. Sci. Res. Eng. Technol.*, 5(10): 45-49.
- Wims, P. (2007). Analysis of adoption and use of ICTs among Irish farm families. *J. Ext. Syst.*, 23(1): 14-27.

School of Social Sciences
College of Post Graduate Studies in Agricultural Sciences
Central Agricultural University (Imphal)
Umiam, Meghalaya, 793103.

A Study on e-Readiness of Extension Personnel in Agricultural Institutions in Ri-Bhoi District of Meghalaya

(Interview Schedule for Extension Personnel)

[Note:In this context, Information Communication Technologies (ICTs) refer to an expanding assembly of technologies that are used to handle information and aid communication. These include hardware, software, media for collection, storage, processing, transmission and presentation of information in any format (i.e., voice, data, text and image), Computer, Mobile, Internet, email, Telephone, Radio, Television, Video, Digital Cameras etc.]

1. Personal profile of the respondent

Name :
Age :
Gender : Male /Female
Mobile no. :
e-mail id(s) :
Address :
Education : Graduate/Post-Graduate/Doctorate/Diploma/Any Other (Please Specify)
Name of the organization where working :
Name of the post held/Designation :
Job Experience :
Area of specialization : Teaching/Research/Extension/Training/Administration/ Any Other (Please Specify)

2. Possession of Smart Gadgets

Please give your response with a tick mark (√)

SI No.	Question	Yes	No
1.	Do you have a personal computer / laptop?		
2.	Do your personal computer/ laptop have internet connection?		
3.	Do you have a mobile phone?		
4.	Do you have a smart phone?		
5.	Do you have internet facility to your mobile phone/smart phone?		

3. Training received in ICTs

1.	Have you participated in any training related to ICTs?	Yes	No
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4. Sources of Awareness about ICTs

Please indicate the source of information from which you got information about the following ICTs.

Sl No.	Source of information ICTs → ↓	Family Members	Through News paper	Office / institution	Trainings	Summer / winter camp	Internet	Friends / Colleagues	Any other (Please specify)
1	Computer								
2	Laptops								
3	Internet								
4	e-mail								
5	Scanner								
6	Printer								
7	Radio								
8	Television/L CDs								
9	LCD Projector								
10	Digital Camera								
11	Video camera								
12	Handy cam								
13	Tele conferencing								
14	Video conferencing								
15	CD/DVD Player								
16	Mobile								
17	Fax								
18	Landline								
19	Technical support								
20	Any other (Please Specify)								

5. Attitude towards ICTs

A set of statement given below represents attitude of extension personnel's towards use of ICT in transfer of technologies. Please express your feelings about these statements by indicating the degree of your agreement or disagreement on the five point continuum.

(SA: Strongly Agree A: Agree UD: Undecided DA: Disagree SDA: Strongly Disagree

Sl. No.	Statements	Response Categories				
		SA	A	UD	DA	SDA
1.	ICTs are best possible bridges between research system and farming system to reduce the research dissemination gap.					
2.	ICTs reduce the trainings and demonstrations cost.					
3.	ICTs reduce face to face contacts between extension personnel and farmers.					
4.	ICTs demands more time and creativity to develop qualitative content for ICTs in agriculture.					
5.	ICTs involve more cost for installation and maintenance.					
6.	ICTs require constant updates of content in local language					
7.	ICTs use creates problems to those extension personnel who lack knowledge and inexperience with online technologies.					
8.	ICTs may replace the traditional extension methods in agriculture in near future.					
9.	Through the use of ICTs for dissemination of agricultural technologies, more numbers of farmers, scientists and expert can interact at the same time.					
10.	With the use of ICTs, working ability and capacity of the agricultural extension personnel can be upgraded.					
11.	ICTs are more profitable and potentially faster tools to remote and diversified areas where agricultural extension services are not easily and frequently available.					
12.	Transferring relevant information through ICT is not an easy task.					
13.	ICTs based extension services are better alternative to present and future agricultural extension system.					
14.	Modern ICTs applications could change the present way of functioning of researchers, experts, extension agents and farmers in agriculture.					
15.	Feedback is fast through ICTs than traditional methods.					
16.	Existing ICTs infrastructure is not enough to meet the needs of the intended users.					
17.	ICTs alone cannot solve all the problems related to agriculture.					
18.	With the help of ICTs, a new skilled and knowledge society can be developed.					
19.	Access to information at doorstep through ICTs is really a boon to agriculture.					
20.	I am comfortable to use ICT in technology dissemination.					

6. E-readiness of agricultural extension personnel

A set of statement given below represents e-readiness of extension personnel's towards use of ICT in transfer of technologies. Please express your feelings about these statements by indicating the degree of your agreement or disagreement on the five point continuum.

(SA: Strongly Agree A: Agree UD: Undecided DA: Dis-agree SDA: Strongly Disagree)

Individual e-readiness						
Technology access (please tick ✓ on the below options, which do you think is related to it)						
Availability at personal and individual level						
S I N O.	Statements	Response Categories				
		SA	A	UD	DA	SDA
	I have Personal computer/laptop with adequate and necessary software installed.					
	I have Internet facility in home and mobile as well.					
	I have smart phone with necessary information softwares installed and can operate as well.					
Accessibility						
	Each employee can access the ICTs available in the department as per need.					
	Every employee has given personal computer/laptop for working hours in office with internet facility.					
	Only technical personnel can access the ICTs available in the department.					
Ability/Technology skills (please tick ✓ on the below options, which do you think is related to it)						
Basic computer skills						
		SA	A	UD	DA	SDA
	I have knowledge of the basic functions of computer hardware components (CPU and monitor) and its peripherals (printer, scanner, speaker, mouse etc.)					
	I know the basic Microsoft windows operations and can do without any help except only in emergency.					
	I am comfortable using a computer several times a week to participate in an online programme.					
	I know how to use modern ICTs (videoconferencing, online sharing, mobile learning etc.)					
Internet skills						
		SA	A	UD	DA	SDA
	I am able to communicate well with others using online technologies (e.g., email, chat etc.).					
	I have an email id and use it properly and safely.					
	I can open the websites through internet explorers.					
	I have working knowledge of group mails (Google group), online file sharing with google doc and know well how to use discussion boards, chat tools etc					

	I know the video chatting (skype, google chat etc.) for delivering lessons to intended users.					
	I know the use of social networking sites (facebook, twitter etc)					
	I know how to send heavier files by using specialized services like yousendit etc.					
	I have knowledge of online survey and I can use it.					
	I know how to access an online library and other resource database.					
Software literacy applications						
		SA	A	UD	DA	SDA
	I know how to use file compression.					
	I able to have several applications opened at the same time and move easily between them.					
	I have attended seminars / workshops related to online learning activities.					
	I have done atleast one course on ICTs and related aspects.					
	I know how to modify, add, and delete content and assignments using an online Learning Management System.					
Motivational factors						
		SA	A	UD	DA	SDA
	I think that I would be able to remain motivated.					
	I think that I would be able to complete my work even when there are online distractions (e.g., friends sending emails or Websites to surf).					
	I think that I would be able to complete my work even when there are distractions in my home or workplace (e.g. Television, children, guests and such).					
	I am able to learn on my own without any formal training.					
	I am not interested at all for e-learning.					
Institutional e-readiness						
Administrative policy/instructions/commitment (please tick <input checked="" type="checkbox"/> on the below options, which do you think is related to it)						
		SA	A	UD	DA	SDA
	The institution is willing to employ or to assign an academically capable and/ or experienced faculty to oversee the implementation of the e-learning/ICT environment.					
	The institution is willing to accept ICT/e- earning as a mode for Teaching/Research/Extension.					
	Computing is firmly integrated into the institution's culture.					
Resource Support(Technical, Financial, Human)						
		SA	A	UD	DA	SDA
	The institution is willing to create a budget for implementing ICT/e-learning and financially ready to venture into ICT/e-learning.					
	The institution has adequate human resources to support an ICT/e-learning initiative.					

	The current technological infrastructure is adequate to build and/or sustain an ICT environment.					
	The institute has necessary system capacity and well-developed technical infrastructure to support the ICT.					
	Institution has its own website, own designed programmes.					
	Institution has its own e-security policy and own ICT policy.					
	Institution has contact/liason with the local, regional and state level institution that has e-learning assisted extension services.					

7. Utility of ICTs in Extension/infusing ICTs in extension

In your opinion whether the following ICTs are useful for carrying out extension activities or not. Please Tick mark (√) on the following options provided below. You can tick on more than one option, if it is used in more than one purpose.

Planning= P, Implementation=I, Evaluation=E, Group Meetings=GM, Group Discussions=GD, Field Visits=FV, Awareness=A, Transfer of Technologies=TOT

SI No.	ICTs Technologies	Useful	Purpose of utility							
			P	I	E	GM	GD	FV	A	TOT
1.	Audio-visual systems									
1.1	Television sets									
1.2	Radio									
2.	Telecommunication facilities									
2.1	Telephone									
2.2	Satellite Tele Communication									
2.3	Video Conferencing									
2.4	Tele Conferencing									
2.5	Digital camera									
2.6	Video camera									
3.	Computer Electronic communication/networks									
3.1	Internet									
3.2	Search engines									
3.3	Email									
3.4	Intranet									
4.	Computer software									
4.1	Spreadsheets									
5.	Community Radio/Farm Radio									
6.	Specific Knowledge Portals (Rice Doctor, Honey bee, RKMP,									

	AGMARKNET, Digital Mandi, e-Sagu etc.)								
7.	Mobile telephony								
8.	Landline (Kissan Call Centre)								
9.	Farmers Call Centre								
10.	Online social networking								
11.	Digital video transmissions								
12.	Expert database /Expert system								
13.	Kiosks/Common Service Centers (CICs)								
14.	Learning Management System (LMS)								
15.	Global Positioning System (GPS) units/Geographical Information System								
16.	Statistical Package for Social System								
17.	Decision Support System								

8. Access to ICTs Tools and frequency of Use

Please indicate by a tick mark (√) against each ICTs resource for its use and frequency.

(Some of the below mentioned ICTs resources may be available as central facility, office facility, lab/classroom facility. In that case please also mention it by abbreviating as, Central facility –C, office facility-O and lab/classroom facility-L)

SI No	ICTs resources	Available	If available, in use	If Yes, Frequency			
				Yes	Yes	Daily	Weekly Twice
1.	Computer						
2.	Laptops						
3.	Internet						
4.	e-mail						
5.	Scanner						
6.	Printer						
7.	Radio						
8.	Television/L						

	CDs						
9.	LCD Projector						
10.	Digital Camera						
11.	Video camera						
12.	Handy cam						
13.	Tele conferencing						
14.	Video conferencing						
15.	CD/DVD Player						
16.	Mobile						
17.	Fax						
18.	Landline						
19.	Technical support						
20.	Any other (Please Specify)						

9. Purpose of accessing ICTs

Please tick on the following options for which purpose you are using the ICTs

Sl. No.	Purpose	Frequently	Rarely	Never
1	For sharing information			
2	For storing information			
3	For networking with other organizations			
4	For process and analysis (data/information)			
5	For accessing knowledge			
6	Please specify if any other			

10. Problems faced with reference to Information and Communication Technologies (ICTs)

Sl. No.	Problems faced during usage of ICTs

11. Psychological Profile of the Respondents

Below are a set of statements pertaining to different domains. Please feel free to express your feelings about these statements by indicating degree of your agreement or disagreement on the five Point continuum.

(**SA**: Strongly Agree **A**: Agree **UD**: Undecided **DA**: Dis-agree **SDA**: Strongly Dis-agree)

a. Achievement Motivation

Please indicate your agreement or disagreement by putting tick (\checkmark) mark for the following item.

SI No.	Statements	SA	A	UD	DA	SDA
1.	One should work like a slave at every time one undertakes until he/she is satisfied with the results.					
2.	One should have determination and driving ambition to achieve certain things in life even if these qualities make one unpopular					
3.	An individual should regard work first, even if one cannot get rest in order to achieve one's goal.					
4.	Even when one's own interests are in danger, one should concentrate on the work and forget his/her obligations to others.					
5.	One should set different goals for oneself and try to reach them.					
6.	It is better to be content with whatever little one has than to be always struggling for more.					
7.	The way things are happenings now a days discourages one to work hard					
8.	When working in groups one should try to excel than others in similar tasks.					
9.	Individual should work hard in a given tasks, regardless suitable rewards.					

(**SA**: Strongly Agree **A**: Agree **UD**: Undecided **DA**: Disagree **SDA**: Strongly Disagree)

b. Innovativeness

Please indicate your agreement or disagreement by putting tick (\checkmark) mark for the following item.

SI No.	Statements	SA	A	UD	DA	SDA
1.	a. I try to keep myself up to date on new ICTs but that does not mean that I try out all new ICTs.					
	b. I feel restless till I try out new ICTs, I have heard about.					
	c. They talk of many of new ICTs these days but who knows they are better than the old ones.					
2.	a. From time to time, I have heard of many ICTs and I have tried out most of them in the last few years.					

	b.	I usually wait to see the results obtained by my colleagues before I try out the new ICTs methods/practices.					
	c.	Somehow, I believe that the traditional ICTs are the best.					
3.	a.	I am cautious about trying a new ICTs					
	b.	After all our forefathers were also in their traditional ICTs.					
	c.	Often new ICTs are not successful however, if they are promising, I would surely like to adopt them.					

(**SA:** Strongly Agree **A:** Agree **UD:** Undecided **DA:** Disagree **SDA:** Strongly Disagree)

c. Job Performance:

Please evaluate your job performance by putting a tick mark under the appropriate category.

SI No.	Characteristics	Good	Average	Poor
1.	Productivity			
2.	Team work			
3.	Quality of work			
4.	Job knowledge			
5.	Decision making			
6.	Problem solving			
7.	Work skill			
8.	Communication skills			
9.	Initiative			
10.	Leadership			
11.	Time management			
12.	Human resource management			
13.	Observing the values/ ethics of research system			
14.	Achievement motivation			
15.	Stress management			
16.	Others specify			