EFFECTIVE AGRICULTURAL INFORMATION DELIVERY SYSTEM –AN ACTION RESEARCH AMONG FARMERS

S. NAZREEN HASSAN

Thesis submitted in partial fulfillment of the requirement
for the degree of

Doctor of Philosophy in Agriculture

Faculty of Agriculture
Kerala Agricultural University, Thrissur

2008

Department of Agricultural Extension
COLLEGE OF AGRICULTURE
VELLAYANI, THIRUVANANTHAPURAM-695522

DECLARATION

I hereby declare that this thesis entitled" **Effective agricultural information delivery system –an action research among farmers**" is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for award to me of any degree, diploma, associate ship, fellowship or similar title, of any other University or Society.

S. Nazreen Hassan

Vellayani

25-11-08

CERTIFICATE

Certified that this thesis entitled "Effective agricultural information delivery system-an action research among farmers" is a record of research work done independently by Mrs. S. Nazreen Hassan under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship, or associate-ship to her.

Vellayani

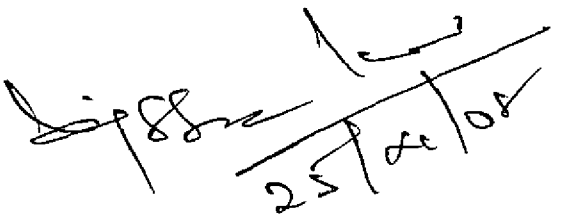
25.11.08

Dr. N. Kishore Kumar
(Chairman, Advisory Committee)
Professor
Department of Agricultural Extension
College of Agriculture , Vellayani

Approved by

Chair person:

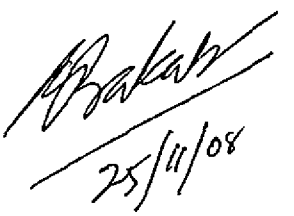
DR. N. KISHORE KUMAR
Professor,
Department of Agriculture Extension,
College of Agriculture, Vellayani- 695 522.



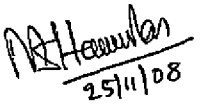
Members

DR. S. MOTHILAL NEHRU,
Associate Director and Head
Department of Agriculture Extension,
College of Agriculture, Vellayani- 695 522.

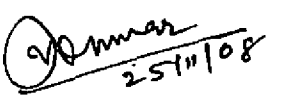
DR. R. PRAKASH,
Professor,
Department of Agriculture Extension,
College of Agriculture, Vellayani-695 522.



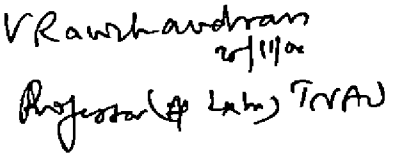
DR. M.S HAJILAL,
Professor (Agrl. Engg),
Instructional Farm,
College of Agriculture, Vellayani-695 522.



DR. VIJAYARAGHAVAKUMAR,
Professor,
Department of Agricultural Statistics,
College of Agriculture, Vellayani- 695 522.



External Examiner:



ACKNOWLEDGEMENT

With abounding joy and overwhelming gratitude, I submit this humble venture at the foot of Almighty, but for His gracious mercy and loving care this endeavour would never have been possible.

At this moment of completion of my thesis, I take immense pleasure in acknowledging my sincere gratitude to all those who extended help and support to me during the course of my work.

No word can truly express the deep sense of gratitude to Dr. N. Kishore Kumar, Professor, Department of Agricultural Extension and Chairman of the Advisory Committee for his invaluable guidance, patience, constant and inspiring encouragement, constructive criticisms and suggestions throughout the course of this investigation and in the preparation of thesis.

I wish to express my profound indebtedness and gratitude to Dr. S. Mothilal Nehru, Professor and Head, Department of Agricultural Extension. I was fortunate enough to have the guidance and I express my sincere gratitude for her expert guidance and unfailing patience throughout my postgraduate programme

I also thank Dr. R. Prakash, Professor Department of Agricultural Extension and Dr. S. Hajilal, Department of Agricultural Engineering - the members of the advisory committee for their critical comments and constructive suggestions throughout the study.

I am truly and deeply grateful to the teaching staffs of the department for their utmost help and encouragement rendered during the study period.

It will be an unredeemable fault on my part if I fail to express my heartfelt thanks to Prof. Dr.C.Bhaskaran, Prof Dr. N. P. Kumari Sushama Department of Agricultural Extension,

Vellayani and Dr. Vijayaraghavakumar, for their help in timely advice during the tenure of my thesis.

I sincerely acknowledge the co-operation extended to me by all the non-teaching staff of the Department Agricultural Extension.

I gratefully acknowledge Sri. C.E. Ajithkumar, Programmer, Department of Agricultural Statistics, for his kindness and co-operation he has rendered during the statistical analysis of data.

I express my affection and indebtedness to my friends at the department Ms. Gopika Somanath, Ms Raji, K. R. and Soya Alphonsa for their help in conducting my training programme.

My hearty thanks are due to Mr.Jayawardane, Mr. Suresh, Priya, Geetha, Bhavya, Kumaran, Smitha and all my colleagues in the college for their good company throughout the study period

I also express my thanks to Mrs.Mini, Agricultural Officer, Mr. Biju, Mr. Binu and Mrs. Sheeba for their all the help rendered in conducting the training at the study area. Finally I thank all those who had directly and indirectly helped me in this venture.

At this moment I recall with love and gratitude, the constant encouragement and inspiration given to me by my husband Mr. Abdul Nizar and especially to my daughter Fahmitha Nahar who suffered all inconveniences during this endeavor. I am deeply indebted to them in making this endeavour a success.

I am deeply obliged to my late father Dr. M. I. Shahul Hameed and I remember him at this juncture who always encouraged me and motivated me in going for this PhD Programme.

Finally I thank Kerala Agricultural University for providing the Senior Fellowship.

S. NAZREEN HASSAN

CONTENTS

LIST OF TABLES

LIST OF GRAPHS

INTRODUCTION

LIST OF PLATES

LIST OF APPENDICES

INTRODUCTION

I. INTRODUCTION

Communication is the web that holds a society together. In spite of the successful researches in new agricultural practices, majority of farmers are not getting upper bound yield due to several reasons. One major reason is that expert advice is not reaching the faming community in a timely manner. The human family is now facing formidable development challenges. Many of the Indian villagers are poor in utilizing information technologies for communication and for information needs. Although many steps were taken to develop on this line, still it is in the primitive stage as independent farmers are dependent on many players. Information Technology revolution is unfolding, and has very high visibility.

The spread of information communication technology (ICT) is currently a very popular point of attention; large-scale as well as small-scale projects are implemented by institutions in bridging the 'digital divide' between developed and developing countries as an important point of concern. In order to obtain a higher level of agreement about this topic, in December 2004 a worldwide meeting was organized in Geneva. This World Summit on the Information Society (WSIS) aimed to upgrade lives through a more egalitarian sharing and shaping of ICT. The second phase took place in Tunis from 16 to 18 November 2005. Harnessing Information Technology for agricultural extension has received high priority in the new policy agenda. Extensive use of modern information technology promoted for communication between researchers, extension workers and their farmer clients to transfer technologies and information more cost effectively. The flow of information in the recent years is so tremendous that farmers are actually drowning in the vast pool of information, but there is lack of efficient system to transfer the same to the needy people. The thirst for quenching this need forced us to find out effective means for

transfer of technology. Today Agricultural production is becoming ever more dependant on ICT for information, input and marketing.

ICT is defined as the term used to describe the tools and processes to access, retrieve, store, organize, manipulate, produce, present and exchange information by electronic and other automated means. These include hardware, software telecommunications in the forms of personal computers, scanners, digital cameras, phones, faxes, modems, CD and DVD players and recorders, digitized video, radio and TV and programs like database systems and multimedia applications.

Agricultural Information Delivery System (AgIDS) is an integration of technologies and the processes to distribute and communicate the desired agricultural information to the target audience, the farmers, in a personalized manner.

The fast changing scenario of agriculture calls for the revitalization of the extension system so as to make effective transfer of technology. Agricultural Information Delivery System (AgIDS) acts as a highway in getting the quickest and reliable up-to-date information from any corner of the earth. It has started to make the pressure felt in rural India.

The explosive presence of Internet and the rapid adoption of Internet supported activities have created a wide range of opportunities and expectations. Internet for Agriculture in general and extension in particular are no exception. Extension providers' and client expectations include superior information accessing and dissemination, ongoing farmer-extension-research communications and marketing. This in turn effect in better knowledge management, real and "just-in-time" information updating, discussion forums, integration of information sources, improved extension delivery, extension service organization and more. Although the potential advantages of information systems over the conventional methods of information dissemination were recognized in the late eighties they were seldom effectively exploited. The most critical task facing service providers is

determining real user needs. The farmer is under siege from so much interesting and generally useful information that it is difficult for him to utilize it in a way that will benefit him in practical terms. It will have to become more targeted, more personal. AgIDS offer tremendous potential for accelerating development. They are transforming our lives, creating wealth and impacting every facet of human endeavor.

So AgIDS should be made available, particularly, to those with specific inquiries to guide them in adopting the more knowledge intensive forms of agriculture, which will expand in future. Agricultural marketing requires connectivity between the market and exporters, growers, traders, industry consumers, through wide area network of national and international linkages in order to provide day-to-day information with regard to commodity arrivals and prevailing rates etc. To provide links for on-line International market information; to provide export related documentation, to inform about the latest research in agricultural marketing, packaging, storage related information and to provide connectivity with lead international and national market organizations AgIDS play a very important role.

Quick dissemination of technological information from the agricultural research system to the farmers in the field and reporting of farmers' feedback to the research system is one of the critical inputs in transfer of agricultural technology. The information and communication support during the last 55 years has mainly been conventional. Further the diversity of agro-ecological situations adds to this challenge. Farmers' needs are much more diversified and the knowledge required to address them is beyond the capacity of the grass root level extension functionaries. Today it is possible to find a solution to this situation by using the potential of information and communication technologies through the AgIDS to meet the location specific and individualized information needs of the farmers.

A large number of organizations play an active role in the diffusion of ICT in developing countries. In India also the information and communication networks are expanding very fast. The number of Internet connections in India up to March 2007 was 9.21 million and the number of broadband subscribers was 2.28 million. The number of

telephone connections is 206.83 million. *(Source: DoT).* The Internet connectivity has touched almost all the districts in the country and is moving down to the block and Mandal levels. Pilot projects to connect rural community to the cyber-space are underway at various locations. The initial response of the rural people, particularly women, has been very encouraging. The Policy Reforms in Agricultural Extension focuses on utilizing the potentials of ICT in extension. The National Institute of Extension Management (MANAGE) has taken the initiative to provide linkages to the technical and other farmer friendly information through its Web-Site. MANAGE is also supporting a number of Agricultural Universities and other research and training organizations, both in public, and voluntary sector in building their capacity to digitize the Agricultural Information to digitize their technical information and host the same on the Web. These web sites have improved the information dissemination of these institutions significantly. It has established Internet connectivity in 28 Districts in 7 States, namely Andhra Pradesh, Bihar, Himachal Pradesh, Jharkhand, Maharashtra, Orissa and Punjab under National Agricultural Technology Project (NATP). Over 200 blocks have already been connected with Internet under NATP. A number of State Agricultural Universities, government departments and also some private entrepreneurs have hosted Agricultural Web Sites. The Agricultural Information Base on the Net is building up slowly but surely.

There are many successful ICT-projects in our country. They include the e- choupal of Indian Tobacco Company(ITC), the Warana Wired Village Project, the E-seva (e-services project) the Akshaya in Malappuram district (Kerala) , Drishtee in Sirsa district (Haryana), M S Swaminathan Research Foundation's (MSSRF) Information Village Research project in Pondicherry, and the Sustainable Access in Rural India (SARI) project in Madurai district (Tamil Nadu). Considering the need for the enhanced use of ICT in agriculture, the Department of Agriculture, Government of Kerala has established information kiosks with the support of Indian Institute of Information Technology Management-Kerala (IIITM –K) under the name KISSAN (Karshaka Information System Services and Networking). This was functioning exclusively for agricultural purposes in ten Krishi Bhavans of the Trivandrum district.

The present study attempts to examine the various aspects of Information and Communication Technology (ICT) in Kerala. It is a pilot study attempted to investigate whether the attributes or other factors influence people's behaviour towards ICT. It also aims to make an assessment of the efficiency of these information kiosks with the objective of suggesting measures for improvement. From the findings it seems that attributes of ICT have some influence on the SES of the respondents and also the communication behaviour. However, a person's ICT skill development activity was found to be influenced more strongly by the action research.

1. 1. OBJECTIVES OF THE STUDY

The general objective of the study was to analyze the efficiency of the existing Information Communication Technology (ICT) viz., the information kiosks by studying its influence on the knowledge of the users and the non users. The study also aims at identifying the constraints and to elicit suggestions for improving the efficiency of information kiosks. More specifically the present study was designed with the following objectives

To study the influence of the profile characteristics of users and non-users.

To study on the attributes of ICT and to find out the effectiveness of the existing ICT facility.

To assess the needs of the users and non-users with regard to knowledge/ information and skills.

To compare the communication behaviour of the users and non-users of information communication technology.

To find out the efficiency of ICT as perceived by the users and non-users.

To document the knowledge gained by the non-users subjected to training at different intervals of time -one week, one month and three months after the training.

Explore the perceived constraints in the use of ICT by the users and non-users.

To document the suggestions given by the users and non-users for improvement of the existing ICT facility.

1. 2. SCOPE OF THE STUDY

Applications of effective information delivery systems in agriculture and to rural development are very extensive and pervasive. Agricultural information systems have attracted much attention because of the importance of facilitating access to information and also it is widening our markets. The information systems themselves are in a process of profound transformation with the spectacular development of the internet, and the possibility of evolving towards web-based information systems, even in developing countries. But beyond databases and information systems, the applications of ICT in agriculture and rural development are appearing everywhere. They are profoundly transforming extension services through the use of multimedia technology and through the use of long distance education technology, as well as through the possibility of developing innovative approaches based on interactive knowledge development processes that involve researchers, extentionists and farmers. They are having a clear impact on our capacity to monitor the environmental impact of agriculture and the degradation of natural resources through remote sensor data. Instant connectivity and electronic networks have the potential for changing the way we do research, with profound impacts on the organization of research and on the need to re-think the interaction between research, education and extension. In this way this project has its importance to change our present farming community and help them to acquire more timely knowledge to improve their standard of living. The communication behaviour and the fifteen attributes of ICT helped for in-depth analysis of the effectiveness of ICT in the study area. Moreover the action research aimed

at improving the knowledge level and skills of the non users. It had given positive results in improving the knowledge and skills of the farmers. It is hoped that this study will facilitate policy makers in bringing about improvements in this interactive knowledge development process which will reflect on our overall development.

1. 3. LIMITATIONS OF THE STUDY

The researcher faced all limitations due to a single investigator. This study is first of its kind in the institution. The researcher felt difficulties in all stages of the research. Lack of infrastructure in documentation and processing was another limitation experienced by the researcher. Since this study was completely based on perception and expressed opinion of the respondents it may not be free from personal bias and prejudices. Care was taken to avoid this and make the study as objective as possible. The researcher faced friction in collecting the data on information need as the farmers were in a mood for agitation due to the crisis in agricultural sector. Moreover while analyzing the field conditions to identify his needs the researcher faced problems like lack of infra structure in documenting. If these limitations are rectified the research programme will provide a streamline for future researchers in this area.

1.4: ORGANIZATION OF THE STUDY

The thesis is presented in five chapters. The first chapter is 'introduction' in which the importance of the study, objectives, scope and limitations of the study are dealt. The second chapter is 'theoretical orientation' which deals with the concepts and related findings of the study. The third chapter is 'methodology' which encompasses the details on selection of the study area, sampling, data collection procedure, variables selection, empirical measures used, design of the action research, statistical tools used etc. in the fourth chapter the results in relation to the objectives with interpretation of the findings and discussion are presented. The fifth chapter summarizes the study highlighting the salient findings.

THEORITICAL ORIENTATION

2. THEORITICAL ORIENTATION

The main objective of this chapter is to review the crisp and supportive previous researches based on objectives set forth for the study and to develop and establish the theoretical framework for the study based on ideas and concepts gathered from the review of existing literature of both theoretical and empirical nature. After thorough viewing of all the possible sources, it was observed that on certain dimensions of the present study, very few studies have been conducted earlier. Due to limited literature on the subject of study, the closely related literature that had meaningful relation to the present study were also considered and appropriately presented in this chapter under the following headings.

2.1. Historical Roots of ICT in India

2.2. Government's initiatives on agricultural ICT in India

2.3. Computer hyper media

2. 4. Technology transfer through ICT

2. 5. Profile characteristics

2. 6. Attributes of information communication system (ICT)

2.7. Communication behaviour

2. 8. Need assessment of farmers

2. 9. Constraints

2. 1. HISTORICAL ROOTS OF ICT IN INDIA

In India the path towards technology-induced development, especially associated with ICT was set in 1984 by Congress Government under Rajiv Gandhi and Sam Pitroda. They adopted informatization of Indian society as an effective route to development. A high power National Task Force on Information Technology and Software Development was later set up by Bharathiya Janatha Party Government.

2. 2. GOVERNMENT'S INITIATIVES ON AGRICULTURAL ICT IN INDIA

Information and Communication Technology (ICT) is the driving force for the fundamental economic and social revolution. It accelerates globalization, makes access to knowledge and information much easier for the people in respect of: creation of technologies, diffusion of old innovation and diffusion of human skills for rural prosperity.

The National Conference on Informatics for Sustainable Agriculture Development (ISDA) organized by the Ministry of Agriculture and National Informatics Centre (NIC), in May 1995, has given much needed "roadmap" to usher in "ICT led agriculture development" in the country.

ICTs diffusion and infusion have many potential applications spanning the breadth of the agricultural industry, at all scales of organization from farmer, to cooperative and professional bodies, from farm machinery vendors, fertilizer and chemical companies, insurance, regulators, and commodities, to agronomists, consultants, and farm advisors. The information society generates and consumes enormous amounts of information and at the same time information technological progress has made it easier to process, store and communicate information and knowledge in new ways. Alone the ever-accelerating Internet generates innumerable quantities of information supported by a decrease in telecommunication costs as well as in hardware prices. The Government has taken all necessary steps to boost IT for agriculture and integrated rural development. Many follow up actions (ICT projects: AGMARKNET, DACNET, etc) were taken up, to provide

relevant agricultural information in rural areas, helping farmers to improve their labor productivity, increase their yields, and realize a better price for their produce. This initiative is based on the recommendations of ISDA-95 Conference (Informatics for Sustainable Agricultural Development), includes: -

- AGRISNET: An infrastructure network up to block level agricultural offices facilitating agricultural extension services and agribusiness activities to usher in rural prosperity
- AGMARKNET: With a road map to network 7000 Agricultural produce wholesale markets and 32000 rural markets
- ARISNET: Agricultural Research Information System Network
- SeedNET: Seed Informatics Network
- Co Opnet: To network 93000 Agricultural Primary Credit Societies (PACS) and Agricultural Cooperative Marketing Societies to usher in ICT enabled services and rural transformation
- HORTNET: Horticultural Informatics Network
- FERTNET: Fertilizers (Chemical, Bio and Organic Manure) Informatics Network facilitating "Integrating Nutrient Management" at farm level
- VISTARNET: Agricultural Extension Information System Network
- PPIN: Plant Protection Informatics Network
- APHNET: Animal production and Health Informatics Network networking about 42000 Animal Primary Health Centres
- FISHNET: Fisheries Informatics Network
- LISNET: Land Information System network linking all institutions involved in land and water management for agricultural productivity and production systems, which

has now evolved as "Agricultural Resources Information System" project during the Tenth Plan being implemented through NIC.

- AFPINET: Agricultural and Food Processing Industries Informatics Network
- ARINET: Agricultural and Rural Industries Information System Network to strengthen Small and Micro Enterprises (SMEs)
- NDMNET: Natural Disaster Management Knowledge Network
- Weather NET: Weather Resource System of India

The Vision 2020 document of the Department of Agriculture and Co-operation envisages that "the tools of ICT will provide networking of Agriculture Sector not only in the country but also globally and the Centre and State Government Departments will have reservoir of databases" and also "bring farmers, researchers, scientists and administrators together by establishing "Agriculture Online" through exchange of ideas and information".

2. 3. COMPUTER HYPER MEDIA

Computer is gaining importance in the field of agriculture as a media to transfer the technology. In order to bring out the salient features of this technology the related literature was perused.

Andara (1999) explained that American agricultural sectors reviewed the growing importance of information technology and have constructed American reference centers for the access of information to the farmers in agricultural sectors.

Celik (1999) indicated that difference between the industrial and the agricultural sector lie in the technology we use. He also insisted the importance of developing various software programs for the development of agriculture.

Johnson (1999) said that worldwide websites were used for few educational programs with most of the websites dealing with technology transfer. He also explained the growing importance of agricultural websites in the developed countries.

Zhang (1999) indicated that the information system of agriculture with the assistance of the computers is highly important in the structure and composition of the extension system for agricultural technology.

Robert (2001) explained that the extension services with the IT effect affect each part of agricultural sequence like relative advantage, compatibility, complexity and trialability.

From the above literature it is clear that the computer is a media used for giving instructions. Among the various tools used so far, computer is high tech in nature. The developed countries like America provide reference centers for their farmers. Websites are also gaining importance in technology transfer. This affects the relative advantage, compatibility, complexity and trialability in the technology that is transferred.

2. 4. TECHNOLOGY TRANSFER THROUGH ICT

How computers can be used for technology transfer and the various modes of doing it are discussed below.

Madur (1988) concluded in his research that little attention has been given to defining models for the implementation of technology transfer to the less developed countries. This is due in part to the lack of adequate measurements of the intangible or subjective factors that influence the problem of technology transfer.

Miller (1989) indicated one of the best known categorization of computer system in his book" The computer in the school:Tutor, Tool and Tutee", he states that the computer can serve three different roles in the educational process as a tutor, tool and tutee.

Brown (1992) in his research examined and highlighted the life cycle of technology transfer. The focus was on intra-firm dynamics and processes. The research proposed on

adaptable methodology for management of technology, through its various stages while defining the necessary inputs and outputs.

Budhar *et al.*, (1992) reported that the International Rice Research Institute have developed many models to predict the potential of rice and soybean varieties for given weather condition. The Rice Model was tested at the Tamil Nadu Rice Research Institute and the results revealed that the experimental yield agreed satisfactorily with the yield predicted by the computers.

Murali (1993) developed a database on telephone based interactive voice response system (Audio text), which contains information pertaining to the farmer, the agronomic condition of the field, individual field observation, recommendations model constants and the weather data. The user enters the field observations using a touch –tone telephone and pre recorded message are used to guide the user during the data entry and for advising control measures.

Hahnweonsik *et al.*, (1994) developed a data base in Agriculture Technology Information Network System (ATINS) which comprises an agricultural technology Dictionary, weekly Agricultural information, information on natural agricultural research, integrated technology information and international research information on crops and livestock, price information, weather information and international research information.

Kraema and Dedrick(1994) examined data of 11 countries, which showed a significant positive correlation between investment in IT and growth in GDP and productivity.

Mohan and Arumugam (1994) developed a personal computer (PC) based expert system (CROPES) for selecting crops in a region in Tamil nadu, India. This system acts as an intelligent consultant by asking a set of questions and then suggests appropriate crop. It recommends crops to farmers based on location, climate, soils and available resources.

According to Aasher (1995) micro computer technologies have the potential to support all the major functions of agricultural extension, namely the technology generation, diffusion , adoption continuum and the efficient handling of descriptive, diagnostic, predictive and prescriptive type of information.

Shastri (1996) found out that the technology transfer in Japan, China, the newly industrialized countries and the less developed countries showed marked contrast in their development of technology transfer through computers.

Jones (1997) explained that cyber extension would save money time and effort. Scientists will prepare electronic version of messages themselves. These versions don't have to be printed and posted. Cyber messages will be updated online and that saves time too. Cyber extension can provide more in-depth analysis and can also provide detailed on-farm research results to the curious users/ farmers.

He also recorded that cyber extension will remove a number of steps altogether from the traditional extension process. In the context of agriculture, the zonal workshops and training to subject matter specialists (SMS) can be eliminated altogether. All those concerned will get the information immediately and queries / classifications will also be addressed equally fast, without involving a chain of extension machinery.

He also stated that cyber extension would be information rich and interactive. It appeals to the curious extension workers and analytical farmers. It will allow them to search and locate the information they need quickly. The extension workers can talk to the concerned scientists for more information on the subject, wherever the scientists may be. The rural technologies may be made available on CD- ROMs for quicker dissemination.

Balit and Masias (1997) stated that with new information and communication technologies, rural communities can acquire the capacity to improve their living conditions and become motivated through training and dialogue with others to a level where they make decisions for their own development.

Javed (1999) stated the experiences of "Info Village Project" in Pondicherry by M. S. Swaminathan Research Foundation (MSSRF) and "Warna Wired Villages" in Maharashtra in India. They have conclusively demonstrated that if the information is available at the door step, farmers are willing to pay and make use of extension information and marketing information. It has been demonstrated by these initiatives that the villagers can manage these information centers themselves. He has stated one typical example of one of the villages, under "Info Village Project" in Pondicherry. Four village women, who have studied up to only class IX, are managing the information center effectively. They are able to send and receive e-mail, fax to/from the main hub at Villianur and also to MSSRF headquarters at Chennai. They download the daily news from the main hub and display on the bulletin board, outside their info centers.

Warren and Stone (1999) indicated that Internet was used for commercial farming than for subsistence farming in England.

Costopoulou and Lambrou (2000) found that

- E-Commerce was used to provide precise, low cost information to bee business transactions.
- It resulted in greater efficiency, increased responsiveness and cost reduction.
- It leads to greater modernization of marketing and distribution of hive products.

Munnyua, (2000) states that ICT plays a catalytic role in developing rural areas including decision making process, market outlook and empowerment of rural communities.

Gosh (2001) opined that the applications of ICT to agriculture and rural development are appearing every where. They are profoundly transforming extension services through the use of long distance education technology, as well as through the possibility of

developing innovative approaches based on interactive knowledge processes that involve researchers, extensionists and farmers.

Jain and Dahiya (2001) stated that IT applications such as computers networking, database systems etc would help to sustain self sufficiency in food as it is essential that the farming community becomes the most wired society.

Ghosh (2004) remarked that the effectiveness of any institution depends on the delivery mechanism and the supportive roles and procedure acting in harmony with each other so that the institution can discharge the functions and play the assigned role. For keeping in track, the institutions need interaction and exchange of ideas with the stakeholders of the programme. IT intervention can facilitate this process, he observed.

According to KISSAN News Report (Anon.,2004), the ICT innovative project in Kerala, received a total number of 1341 hits from kiosks, and the total number of queries answered so far is 1531. The total number of e-mails received back in October 2004 is 26, and the mostly accessed page is on crop information and most accepted page is the market information.

According to Kumar and Kumar (2004), internet communication can create new information resources and can open new communication channels for rural communities and agricultural organizations. It offers a means for bridging the gap between development professionals, rural people and agricultural producers through the initiation of interaction. It can act as a catalyst in spreading up the entire development process.

Prasanth and Gupta (2004) reported on the e-Seva (Electronic Service) in Andhra Pradesh aimed at integrating and offering a wide range of Government to citizen services at a single location. According to the report, the number of centers gradually increased from 4,300 in August 2001 to 1, 46,324 in February 2002 and an estimated transaction of 6.3 million were performed through these centers.

Arabi (2005) based on his study on empowerment of women in information and communication Technology made some policy recommendations to enable the women force into the mainstream of ICT sector in the country.

Arora (2005) observed that technology is rapidly evolving and the farmer must keep up with the changes that may be of benefit in his or her operation. The PC is one example of such technology. He added that the computer can help the farmer organize and manage the data more effectively.

Kumar (2005) said that the low level of the personal computer and internet penetration and the modest telecommunication spread in the country necessitate special messages to ensure that these benefits reach the common man. One of the key elements identified in this context is widespread establishment of community citizen services centers in all parts of the country, including particularly its hinder land, to deliver an entire range of services to citizens using modern ICTs.

Lopoyetum and Velanganni (2005) conducted a study on e-governance on the people of Dindigul and found that 80 per cent of the respondents felt the need for e-governance and 70 per cent were favourable for higher benefits of e- Governance.

Reddy and Ankaiah(2005) made an effort to present a solution to bridge the information gap through a cost effective agricultural information dissemination system(AgrIDS). According to them this effort has assumed great importance due to the trend of globalization and demand in the world market.

Anand and Parashar (2006) argue that the ITCs e-choupal has created a virtual market place where the farmers can transact directly with a processor and realize better prices for their produce.

Chattopadhyaya (2006) has measured the readiness index of different countries which is an assessment of use of internet and World Wide Web for provision of information,

products and service in a country. She found the readiness index of India to be 0.4001 which ranked seventeenth among the twenty countries listed.

Transfer of technology by the traditional mode is a time consuming process. From the above literature it is clear that the modern computer applications in transfer of technology are easy and made available for all. In USA the community technology centers are established in low income urban and rural areas. It is very successful project. The days are not far that in our country every village has an information centre.

2. 5. PROFILE CHARACTERISTICS OF USERS AND NON USERS

A number of studies were conducted on the nature of relationship existing among the personal, socio psychological and socio technical variables of the farmers. These studies revealed different kinds of relationship. The present study aims to look into these variables and find out if any variable has any influence on the attributes of ICT, the communication behaviour and the knowledge requirement and skill requirement of the farmers.

2. 5. 1. Age

Suganya (2000) in her study conducted on mass media utilization behaviour of extension personnel reported that a majority of the respondents (60.5%) belonged to old age group.

Shibi (2002) studied on effectiveness of computerized presentation on sericulturists and observed that majority of the respondents who were exposed to computer presentation were middle aged (43.4%).

Anandaraju (2002) when studied the effectiveness of interactive multimedia compact disc on farmers found that majority (92%) of the ICT users belonged to the age group of between 24 and 53 years.

Kaur and Kaur (2005) when studied on cyber cafes found that 75% of the ICT users were between the age group of 15-25 years.

Based on a study conducted by Kadian and Gupta (2006) on the effectiveness of video compact disc in dairy calf management found that the maximum number of respondents (40%) were of young age followed by middle age (35%) and old age (25%).

Wime (2007) in his study on adoption of internet in agriculture among Irish farm families found out that in terms of age 48 percent of the respondents were between 35 and 50 years old while 23 percent were under 35 and 50 years old. Also 23 percent were under the age of 35 years.

Akpabio (2007) in a study conducted at Nigeria on utilization of ICT on agricultural extension officials found out that 51 percent of the respondents were between 40 and 50 years of age and 29 percent were between 30 to 40 years of age.

Ommani (2007), based on a study conducted on e-learning, revealed that 51 percent of respondents were between 30 to 40 years of age.

2. 5. 2. Gender

Wime (2007) found out that 92 percent of the respondents were male and 8 percent were female.

2. 5. 3. Education

Kadian and Gupta (2006) in their study, based on the educational qualification, found that, the level of education of the maximum number of respondents (45%) was found to be up to high school, followed by the respondents having education in the category of intermediate and above (28.34%), the respondents having educational level up to primary (18.33%) and the respondents in the category of illiterates (8.33%).

Adescop *et al.*, (2007) found out that 89.6 percent of the researchers and 57.3 percent of extensionists reported having M. Sc as highest academic qualification.

Shibi (2002) observed that majority had medium level of educational status.

2. 5. 4. Occupation

Shibi (2002) found out that 63.3 percent of the sericulturists had medium level of occupational status.

Anandaraja (2002) found out that two third of the respondents had farming as their sole occupation.

Michailidis (2007) on adoption of internet in agriculture revealed that 31 percent of the respondents were engaged in dairy farming and 41 percent had beef production as their main enterprise.

Wime (2007) in his study found out that 83 percent of the respondents had full time off farm work while 57.9 percent had part time off farm work and 50.7 percent were full time farmers.

2. 5. 5. Farm size

Based on a study conducted by Kadian and Gupta (2006) maximum number of respondents (43.33%) had large size of land holding followed by respondents having medium size holding (36.67%). Respondents falling in the category of marginal size of land holding happened to be only 20 percent.

Wime (2007) found that the average farm size owned by the respondents was 41 ha while the average under leased in land included for farming was 53 ha.

2. 5. 6. Experience

Adescop *et al.*, (2007) revealed that 88 percent of researchers reported that they have work experience between three and eight years and 100 percent of extentionists reported that they had four years experience

2. 5. 7. Social participation

The study conducted by Kadian and Gupta (2006) clearly indicated that, most of the respondents (46.67%) had medium level of social participation, while 36.67 and 16.66 percent of the respondents fell in the categories of low and high social participation, respectively.

2. 5. 8. Innovativeness

Suganya (2000) reported that 62 percent of the extension personnel had high level of innovativeness

2. 5. 9. Possession of ICT

According to Ambili (2004) in a study conducted in Kerala on the users of the information systems in Kerala Agricultural University placed internet (95.24%) as the top priority while ranking preferred information sources to meet information needs.

Frempong *et al.*, (2006) showed that more than two thirds of the extension agents owned the traditional ICTs such as telephone, television, radio and video decks.

Wime (2007) found that 56 percent of respondents owned a home PC.

2. 5. 10. Exposure to Internet / IT/ ICT

Dairy Management and Profitability (Dairy-MAP) website users reported that 20 percent of them rarely visited the site and 13 percent indicated that they visited the site once in a month. Users who were Dairy- MAP Alumni were most frequently using the workshop announcement and calendar features of the website (Robert *et al.*, 2000)

Hafkin and Taggart (2001) showed that out of the total number of internet users in 2000 women accounted for 22 percent in Asia, 38 percent in Latin America and 6 percent in the Middle East.

Bindu (2002) in her study on Management information systems in institutional swine farm observed that 87.5 percent of the scientists were using computers.

Chandrima (2004) has found that 5.71 percent of the farmers in Alapuzha district were using internet and other electronic media for getting agriculture related information.

According to the report of TARAHAAT (Anon., 2006), the TARA –haat delivers education, information services and online market opportunities to rural consumers via internet and its Kendra outpost. It reported that in 2000-2001 the number of users per Kendra was 403 and it increased to 1131 during 2005-2006.

Akpabio (2007) found that public extension officers utilize a relatively wider range of ICTs specially the broad cast and print ICTs in a more frequent basis in their extension activities while private extension officers utilize more of telecom or computer ICTs. A non significant difference was seen (0.54%) with regard to the frequency of use of telecommunication or computer technology.

Akpabio (2007) revealed that 89 percent of respondents used computer between 0 and 5 hours a week and 7 percent reported to use computers between 6 and 10 hours a week.

Michailidis (2007) has found out that majority of the respondents valued computer usage (13%) better than internet usage (9%).

Ommani (2007) reported that 89% of the respondents used computers between 0-5 hours a week and 7 percent between 6- 10 hours a week.

Wime (2007) reported that 37 percent of the respondents accessed internet several times per week and the same percentage accessed about once per week and 11 percent accessed daily or nearly everyday.

2. 5. 11. Productivity

Productivity is a word that often puzzles and sometimes frightens people. The concepts and definitions of productivity vary, so do the variety of measurement techniques and opinion as to what is responsible for its increase.

Leo (1986) revealed that productivity has most commonly been defined as ratio of output to input.

Jacob (1990) reported that the initial survey of group farming in paddy cultivation in Kerala indicated that the cost of cultivation was found to be reduced by five to seven percent.

Vedat and Eyler (1990) observed that productivity may be viewed as a measure of performance for the production activity and return to the amount of output produced per unit of input.

Hussain (1992) inferred that 79.41 percent of the farmers got medium yield and 17.65 percent got higher yield for paddy under group management program.

Oostrum (1998) reported that participatory approach helped small farmers association to increase food production and generation of more returns from their lands.

Nath (2004) found that there is no significant difference in the productivity of paddy, coconut, pepper, rubber and banana among the farming systems in the five NARP Zones in Kerala. A decreasing trend of productivity was found in coconut, pepper and rubber.

2. 5. 12. Socio technical variables

Reddy and Reddy (2005) in their evaluation study clearly brought out the feasibility and acceptability of ICT based model of e-saju.

Lambert (1992) listed the advantages of computer aided learning as here under.

-It caters for individualized instruction.

-It allows for interaction with the courseware material

- It requires fewer tutor/ educator resources

-The content is easily adaptable. E.g. Locality and experience.

-The material may be easily updated and expanded.

-It is reliable and

- It may have long term cost advantages.

Nair (2004) had found that 17 percent of the respondents stated that they had required computer literacy to retrieve information using computers. 88 percent opined that computer literacy programmes for those who work in agricultural sector.

2. 6. ATTRIBUTES OF INFORMATION COMMUNICATION SYSTEM

Seethamraju (2006) in his study found that the factors trust and accessibility were the most important determinants of web quality while appearance and personalization were the least important.

2. 6. 1. Availability

Nair (2004) found that 65 percent of the respondents stated that computers are available in their institution.

Hedjazi *et al.*, (2006) revealed that among ICTs, computer and internet availability was perceived as easiest by extension specialists.

Koovakkai and Menakath (2007) had found that with regard to the availability of facilities or services of EDUSAT, most of the teachers had positive opinion (98.33 %).

2. 6. 2. Accessibility

Muller (2000) revealed that one out of 25 US farmers had access to the Internet. Farmers were accessing various e-commerce sites dealing with transaction cost and market price.

According to Minimol (2005) the view of agriculturists on access to resource map a majority of them(77.08 %) in the southern area and a majority of 52.63 percent in central area of the state reported that access to resource map was difficult. A majority of respondents (50.59%) reported it to be very difficult.

Mathew (2005) in the ICTD project newsletter says that e-Choupal services reach out to more than 3.1 million farmers growing a range of crops - soybean, coffee, wheat, rice, pulses, and shrimp - in over 29,500 villages through 5,050 kiosks across six Indian states (Madhya Pradesh, Karnataka, Andhra Pradesh, Maharashtra, Rajasthan and Uttar Pradesh).

Frempong *et al.*, (2006) found that 96 percent of the respondents believed that ICTs could provide access to information on agriculture.

Wime (2007) found that 11 percent of the respondents had access to PC from some other sources and 33 percent did not have access to a PC. 48 percent of the respondents had internet connection in their own home while 6 percent had internet access from else where. 46 percent of respondents did not have any access.

2. 6. 3. Timeliness

Nair (2004) reported that most of the information or reports produced by the Kerala public sector were timely.

2. 6. 4. Relevance

Nair (2004) reports that the MIS in Public sector enterprises as a whole produced many reports that were relevant.

2. 6. 5. Adequacy

According to Koovakkai and Menakath (2007) 47.50 percent of the respondents opined that information provided through EDUSAT was moderately adequate and 15.83 percent opined as in-adequate.

2. 6. 6. Accuracy

Nair (2004) reported that the MIS in Public sector enterprises as a whole produced many reports that were accurate

2. 6. 7. Explicitness

Nair (2004) reports that the MIS in Public sector enterprises as a whole produced many reports that had explicitness.

2. 6. 8. Format clarity

Nair (2004) reports that the MIS in Public sector enterprises as a whole produced many reports that had format clarity.

2. 6. 9. Non redundancy

Nair (2004) reported that the MIS in Public sector enterprises as a whole produced many reports that had non duplication.

2. 6. 10. Cost effectiveness

According to Minimol (2005) fairly a good portion of the sample respondents (66%) were of the opinion that the role of e- governance in ensuring the cost effectiveness is very crucial with insignificant regional and category wise variation in opinion.

2. 6. 11. Up-dated ness

Nair (2004) reported that the MIS in Public sector enterprises as a whole produced many reports that were up to date.

2. 6. 12. Efficiency and effectiveness of ICT

Gupta (1986) in his book on Management Information System has evaluated the various characteristics of the system and found out the efficiency and effectiveness index.

Philip (1995) reported that the straight talk treated with 3D visuals through video was effective among farmers up to 35 years of age where as interview mode treated with 2 D and 3 D visuals was very effective among farmers with higher level of education.

Munnyua,(2000) stated that ICT play a catalytic role in developing rural areas including decision making process, market outlook and empowering rural communities.

According to a study by UNESCO in 2001, the users in the three knowledge centers of MSSRF, Pondicherry, have saved a travel distance of around 100,000 kms and 4000 hours amounting to an imputed value of Rs. 16,000.

Sivakumar (2005) has stated that since 2000, e- choupal has established over 5200 internet kiosks or sanchalaks. These serve approximately 3.5 million farmers living in 31000 villages. At the kiosks farmers learn management techniques, order fertilizers and other supplies at low prices, check market prices and sell products on line with resulting increase in earnings of up to 20 percent.

According to Danraj and Jayawant (2006) one fourth of the respondents contacted under the study reported that they could reduce the cost of procurement of inputs by four percent.

Michailidis (2007) valued highest efficiency for timeliness and better information for decision making.

2. 7. COMMUNICATION BEHAVIOUR

Somasundaram *et al.,* (1990) observed that majority of farm women were aware of the farm broad cast programmes and farm telecast programmes.

Sangha and Kalra (1993) showed that radio and television were used to a greater extent than other mass media sources for disseminating agricultural technology.

Suganya (2000) had found out that 22.7 percent of the extension personnel had low level of information acquisition behaviour and 42.2 percent had medium level. Only 31.1 percent had high level.

Rani and Reddy (2005) in their study on agricultural information management behaviour (AIMB) of extension scientists, found that majority of extension scientists (71.44%) had medium level of AIMB followed by high and low levels equally (14.28%).

2. 7. 1. Information seeking

Shibi (2002) found out that 86.7 percent of the respondents had medium level of information seeking behaviour

Devi and Kaliammal (2006) in their attempt to find out ICT usage among students at Chennai had found out that 58 percent of students operate computers by themselves.

2. 7. 2. Information processing

Suganya (2000) found out that 60.5 percent of the extension personnel were at low level of information processing behaviour, 20.2 percent had medium level and 19. 3 percent had high level.

2. 7. 3. Information storage

According to Suganya (2000) 82 percent of the respondents had low level of information storage behaviour and 16 percent had medium level. Only 2 percent of the respondents had high level of information storage behaviour.

Shibi (2002) found out that 76.7 percent of the respondents had medium level of information storing behaviour

2. 7. 4. Information dissemination

Frempong *et al.*, (2006) revealed that 96.5 percent indicated that ICTs could facilitate the exchange of information among major stakeholders in the agricultural system.

2. 8. NEED ASSESSMENT

2. 8. 1. Information need

Bindu (2000) found out that only 37 percent of the scientist respondents were browsing internet for meeting information needs.

According to Cinthia (2002) the knowledge gain by the treatment with 10 hours duration was found to be superior with 5 hours treatment.

According to Sheriff *et al.*, (2003) the respondents are interested in getting information on fertilizers and pesticides, availability of good quality seeds, techniques of seed treatment and price details of paddy and banana during the harvest. Farmers feel information about price variations in the different market could help to take right decision and also get the maximum profit and they are very much interested in children education and livestock health.

Danraj and Jayawant (2006) reported that through Gyandoot Kiosks, the farmers, particularly small holders, have been getting higher returns due to timely access to market information

Devi and Kaliammal (2006) in their attempt to find out ICT usage among students at Chennai had found out that 62 percent of the students used ICT for educational purpose, 55 percent for news update, 49 percent chatting, 45 percent for e- shopping, 63 percent job related and 53 percent for entertainment purpose. 61 percent of the respondents reported that the web resources helped them to obtain information available elsewhere.

Based on a study conducted by Kadian and Gupta (2006) it was found that treatment with VCD was found to be more effective in terms of gain in knowledge than other treatments.

Wime (2007) reported that of the respondents with PC access 64 percent indicated that they used the PC for farming matters while remaining 36 percent did not.

2. 8. 2. Skill Requirement

Akpabio (2007) when self rated the IT skills of respondents had found out that 68 percent rated their IT skills as poor and 17 percent very poor.

Ommani (2007) found that 94.4 percent of the respondents when made to assess their overall IT skills when self rated on a scale showed that 68 percent responded for poor IT skills and 17 percent very poor IT skills. He also found that the top five IT training needs for extension agents were e-mail 95%, presentation software 94% , SPSS 95 % , world wide web 93% and web page editing 95%. The study also revealed that there was significant relationship between IT skills and knowledge, income, social participation, extent of information seeking motivation, level of job satisfaction and level of education with perceptions of agricultural extension agents regarding the appropriateness of e-learning based Information technology.

2. 9. CONSTRAINT

According to Danraj and Jayawant (2006) half of the respondents expressed irregular internet connectivity as one of the major constraints (50%). Farmers faced problems in using the help lines due to very low tele-density in the rural UP (0.56 phones per 100 people by March 2003).

Danraj and Jayawant (2006) reported that the hurdles faced by the farmers in the Warna Wired Village Project were insufficient specific information (32.00%) and inadequate internet/ phone connectivity (21%). Irregular availability of operator (16%) and irregular electricity (13%) was perceived to be a major factor as well. Lack of infra structure facility was given by 13 percent and inadequate operators knowledge by seven percent. It was also observed that the information kiosks are mostly accessed by members of the co-operative farmers who own their land and the poorest landless labourers do not have any reason to visit the kiosks.

Independent variables and their association with knowledge gain of previous studies.

Authors	Age	Education	Occupation	Farm area	Farming experience	Annual income	Extension agency contact	Scientific orientation	Economic motivation	Social participation	Innovativeness	Socio economic status
Raghupathy (1990)											NS	
Raghupathy and Talwar (1990)											NS	
Selvaraj (1990)	NS	NS	PS	NS	PS	PS		NS	NS			
Somasundaram *et al.*, (1990)	NS	NS	NS	NS	PS	NS	NS	NS	NS			
Reddy and Bhaskaran (1991)							NS					
Parvathy (1995)	NS	NS	NS	NS		NS				NS		

Authors	Age	Education	Occupation	Farm area	Farming experience	Annual income	Extension agency contact	Scientific orientation	Economic motivation	Social participation	Innovativeness	Socio economic status
Philip (1995)	NS		NS	NS	NS	S		PS				NS
Jayasubramanium (1996)	NES	PS	NS	NS	PS	NS	PS	NS	NS			
Murugesan (1998)	NES	PS	NS		NS		NS					
Karthikeyan (1997)	S	NS	NS		NS	PS	NS	S	PS	NS		
Sathyaseelan (1998)	S	NS	NS	NS	NS	PS		NS	PS	NS		
Shibi (2002)		PS	NES									

S-Significant; NS- Non Significant; PS- Positively Significant; NES- Negatively Significant

Independent variables and their association with Skill acquisition of previous studies.

Authors	Age	Occupation	Farm area	Farming experience	Annual income	Extension agency contact	Scientific orientation	Economic motivation	Social participation	Innovativeness	Socio economic status
Philip (1995)			NS	PS	NS		NS	PS			
Jayasubramanium (1996)	NES		NS	NS	NS	NS	PS	NS			
Murugesan (1998)	NES		NS		NS		NS				
Karthikeyan (1997)	S	S	NS	NS	NS	NS	NS	S	S	S	NS
Sathyaseelan (1998)	NS	NS	NS	S	S		S	NS			NS
Shibi (2002)				PS							

S-Significant; NS- Non Significant; PS- Positively Significant; NES- Negatively Significant

Conclusion

The perused literature showed a clear idea of the increased computer usage in the developing countries especially in India. The rural set up should be modified accordingly for the people to access the information clubs. While exposing the rural people to this new avenue the past studies were noted to give an effective idea. From the matrix scoring of the previous studies the independent variables that affect the knowledge gain and skill acquisition of the respondents were studied. In order to satisfy the objectives of the study socio economic variables that would affect the knowledge gain and the skill acquisition of the respondents were identified. A suitable methodology was followed for the study.

METHODOLOGY

3. METHODOLOGY

This chapter describes the research methods and techniques followed in this study. The details have been dealt with under the following headings

3.1. Locale of study

3. 2. Selection of respondents

3. 3. Design of study

3. 4. Variables and their measurements

3. 5. Syllabus of training

3. 6. Tools and techniques of data collection

3. 7. Statistical tools used.

3. 1. LOCALE OF STUDY

3. 1. 1. Selection of district

Thiruvananthapuram district has been purposively selected for the study because this is the only district in Kerala which was having information kiosks being operated in the krishibhavans. The kiosks were run by the Kissan Kerala project which was launched on 1st November 2003 at panchayat level to enable the farmers to communicate with agricultural scientists and officials. Such kiosks were set up at ten Krishibhavans of Trivandrum district namely Attipra, Kazhakootam, Mangalapuram, Sreekariyam, Pothencode, Nedumangad, Karakulam, Kudappanakunnu, Vattiyoorkavu and Ulloor. These kiosks were equipped with the latest multimedia computers, web cameras, network accessories and dedicated internet connections. This is provided for the farmers and extension workers to interact with experts and researchers across the state and beyond. For this there is an interactive portal which facilitates knowledge collaboration between the Department of Agriculture, Kerala

Agricultural University, Farm Information Bureau and other allied departments. The portal also offers market information, virtual market, weather information, crop information, farming practices availability of planting materials, fertilizers and pesticides, seeds, organic manures and the like.

3. 1. 2. Selection of panchayats

From the ten Krishibhavans, three Krishibhavans were selected based on the maximum numbers of users of this ICT facility based on the records available in the Krishibhavans. For getting the number of users the information kiosks in the state of Kerala were visited and the data collected from the records maintained in the kiosks. The data collected from the records of the kiosks show that, in Nedumangad the farmers visited the kiosks @17/month, at Kudappanakunnu it was @15.5/month, at Ulloor it was @14.2/month and at Attipra it was @8.4/month. The exact data from the other kiosks cannot be collected as the records were not properly maintained. Accordingly Kudappanakunnu, Ulloor and Nedumangad panchayats were selected for the study. .

3. 1. 3. Description of panchayat

Details of the panchayats are given in Appendix II.

3. 2. SELECTION OF RESPONDENTS

From each panchayat a list of user farmers were collected from the records of the panchayat. From these lists the respondents were selected by random sampling method. From the list of farmers from the Krishibhavan the farmers who do not fall under the user category were taken as non-users. From this list the respondents were selected by random selection method. Accordingly 60 user farmers and 30 non-user farmers from each panchayat were selected and they formed the respondents of this study. Along with them the role players which include extension workers involved in the information delivery process were also contacted for the study.

Krishibhavans taken for study

Nedumangad

Ulloor

Kudapanakunnu

Plate No. 1. Showing the study area

3.3. DESIGN OF THE STUDY

Once the research project is identified and defined clearly the next stage is the design of the research. The research design gives the complete guidelines for data collection. The research was conducted in two parts. The first part is an exploratory research which analyses the data and explores the possibility of obtaining as many relationships as possible between different variables. This research provides a basis for general findings. This research laid the foundation for action research. This exploratory study conducted helped in finding out the various needs of the farmers with regard to this information system which further helped in conducting the action research. The action research part was done in the form of training to selected non-user farmers, which was conducted in the study area. This helped to impart hands on skills by the non-users and acquire the required knowledge. The effect of the action research was documented in the form of knowledge gain and skill acquisition at one week, one month and three months after the training.

3.4. Variables and their Measurement

Two types of variables were taken into consideration for the study. They were independent variables and dependent variables.

3. 4. 1. Independent variables

From a review of related literature and discussion with experts a comprehensive list of 23 variables were selected and are presented below. The techniques of measurement is also shown against each of them

3. 4. 1.1. Socio Personal variables

Age	:	Structured schedule
Gender	:	Structured schedule
Education	:	Structured schedule

Occupation	:	Procedure used by Anandaraja (2002)
Farming experience	:	Method followed by Pitchai (1987) and followed by Hassan (1997)
Social participation	:	Procedure used by Nath (2004)
Extension agency contact:		Procedure developed by Muthiah (1981)
Cosmopoliteness	:	Procedure developed by Muthiah (1981)

3. 4. 1. 2. Socio economic variables

Annual income	:	Scale developed by Jamatia (1999)
Area under crops	:	Scale developed by Jamatia (1999)
Productivity	:	Procedure adopted by Hardikar (1998) and followed by Nath (2004) with modifications
Possession of ICT Tools	:	Structured schedule

3. 4. 1. 3. Socio Psychological variables

Innovativeness	:	Scale developed by and followed by Hassan (1997)
Scientific orientation	:	Scale developed by Supe (1969) and followed by Pradeeep (2000)
Economic motivation	:	Scale developed by Somu (1975) and followed by Hassan (1997)
Market orientation	:	Scale developed by Pradeep (2000)
Level of aspiration	:	Scale used by Pradeep (2000)

3. 4. 1 .4. Socio technical variables

Physical compatibility

Desirability

Flexibility

Social acceptability

Simplicity

User education

3. 4. 1. 1. Operationalisation and measurement of variables

Variables are defined as those attributes of objects or events which can be measured. In other words they are the characteristics or conditions that are manipulated, controlled or observed by the experimenter.

3. 4 .1. 1. Socio Personal variables.

The socio personal variables of the users and non user included age, gender, education, occupation, farming experience, exposure to information communication technology, social participation, extension agency contact and cosmopoliteness.

3. 4. 1. 1. 1. Age

It refers to the number of calendar years completed by the respondents at the time of enquiry. To measure this variable, the number of completed years was as such considered as the score of the respondent for this variable.

3. 4. 1. 1. 2. Gender

It is dichotomized variable having only two categories namely 'male' and 'female'. For the purpose of this study, it refers to the male and female farmers in the study area. Quantification of this variable was done at nominal level of measurement. A score of 'one' was given to male and 'two' to female respondents.

3. 4. 1. 1. 3. Education

It refers to the highest academic qualification possessed by the respondent. To identify the respondent on this variable the scoring procedure was as follows:

	Score
Illiterate	1
SSLC	2
Pre degree	3
Diploma	4
Graduate and above	5

3. 4. 1. 1. 4. Occupation

Occupation was operationalised as the one based on the actual bread winning time spent in a particular profession and was reckoned as primary and all other occupations in which the respondents were engaged at the time of interview was taken as subsidiary. The scale developed by Anandaraja (2002) was used for the study. The scoring procedure is as follows:

	Score
Farming as a sole occupation	4
Farming+ agricultural labour	3
Farming + Business	2
Farming + service	1

3. 4. 1. 1. 5. Farming experience

This was operationalised as the number of completed years of experience in farming. The scoring procedure followed by Pitchai (1987) and followed by Hassan (1997) with modifications suitable to the study was made use of.

3. 4. 1. 1 .6. Social participation

This refers to the extent and nature of participation of the respondents in various activities of social organizations. The procedure used followed by Nath (2004) with slight modification was used for the study. It was measured as follows

	Score
Not member in any social organization	1
Member in one organization	2
Office bearer	3
Chairman	4
Frequency of participation-:	
Regularly	3
Occasionally	2
Never	1

3. 4. 1. 1.7. Extension agency contact

This refers to the degree to which the respondents met the extension agents for agricultural information. The scoring procedure developed by Muthiah (1981) was followed in this study. This was measured in terms of the frequency of contact the individual respondents had with the extension personnel such as Agricultural assistant, Agricultural Officer, Additional Director of Agriculture, Director of Agriculture/ Bank officers, Specialists from university etc. The responses were scored as follows:

	Score
Agricultural assistant	1
Agricultural Officer	2
Addl.Dir. of Agr. / Dir. Of Agr.	3
Specialists from university	4

Frequency	*Score*
At least once a week but not every day	5
At least once a month but not every week	4
Once in six months	3
Once in a year	2
Never	1

The sum of the scores was taken as the score of the respondent for this variable.

3. 4. 1. 1.8. Cosmopoliteness

Cosmopoliteness was operationalised as the frequency, purpose and duration of visit to nearby towns and villages. The scoring procedure followed by Muthiah (1981) was used with modifications for this study.

	Score
Frequency of visit:	
Very often	5
Sometimes	4
Occasionally	3
Rarely	2

	Score
Never	1
Purpose of visit:	
Agricultural	3
Both agricultural and non agricultural	2
Non agricultural	1
Duration of visit:	
Less than 3 hours	1
3-6 hours	2
6-9 hours	3
One day	4
More than one day	5

The sum of the scores formed the score on cosmopoliteness of the respondent

3. 4. 1. 1.9. Exposure to Information and communication Technology.

It refers to the extent to which the respondent was exposed to internet and information communication technology (ICT) for developing his /her knowledge and skills for the benefit of his/ her profession. The scale developed by Samad (2004) with modifications was used in this study. The scoring procedure was as follows

Exposure	*Score*
At least once a week but not every day	5
At least once a month but not every week	4
At least once in six months but not every day	3
Once in a year	2

	Score
Never	1

Summation of the score of all items gave the score of the respondents on exposure to information and communication technology.

3. 4. 1. 2. Socio economic variables

3. 4. 1. 2. 1. Area under crops

The area under crops was taken as such as given by the respondents.

3. 4. 1. 2. 2. Annual income

Annual income was defined as the total income a respondent derived from agriculture, allied and other occupation in a year. A unit score was given for every one thousand rupees of earning and the respondents were classified as per the class intervals. The scoring procedure adopted by Karthikeyan (1997) and Jamatia (1999) was followed for the study.

3. 4. 1. 1.3. Possession of ICT

It refers to the availability of facilities and opportunities to the respondent for updating of information regarding farming activities.

It was measured by asking the respondents to give the ICT facilities they possess. For each item score'1' is given. Summation of the score for the items gave the score of the respondents on possession of ICT.

3. 4. 1. 2.4. Productivity

It refers to the output per unit area cultivated.

The productivity was measured in terms of the degree to which the farmer perceived the increase in yield compared to the previous year. The scoring procedure followed is given below.

Yield	*Score*
Extremely Agree	7
Quite Agree	6
Slightly Agree	5
Neither Agree nor disagree	4
Slightly disagree	3
Quite Disagree	2
Extremely Disagree	1

3. 4. 1. 3. Socio psychological variables

The socio psychological variables included innovativeness, risk orientation, scientific orientation, economic motivation, market orientation and level of aspiration.

3. 4. 1. 3. 1. Innovativeness

Rogers and Shoemaker (1971) conceptualized innovativeness as the degree to which an individual is relatively earlier in adopting new ideas. The question response and score followed by Hassan (1997) was made use of in this study. The scoring procedure is as follows:

When do you prefer to adopt an improved practice?	*Score*
As soon as it is brought to my knowledge	3
After I have seen other farmers do it successfully in their farms	2
I prefer to wait and take my own decisions	1

3. 4. 1. 3. 2. Risk orientation

Supe (1969) defined risk orientation as the degree to which a farmer was oriented towards encountering risks and uncertainty in adopting any new idea in farming. The scale developed by him and followed by Balasubramanium, Hassan (1997) was used to measure this variable. The scale consists of six statements of which two were negative. These items were rated on a five point continuum.

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Score for positive statements	5	4	3	2	1
Score for negative statements	1	2	3	4	5

3. 4. 1. 3. 3. Scientific orientation

Supe (1969) defined scientific orientation as the degree to which a farmer was oriented towards the use of scientific methods in farming, there were six statements in this scale of which the second item alone was negative. The scoring procedure was as follows:

Response	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Score for positive statements	5	4	3	2	1
Score for negative statements	1	2	3	4	5

3. 4. 1. 3. 4. Economic motivation

Supe (1969) defined economic motivation as occupational in terms of profit maximization and relative value the farmer places on monetary gains.

The scale developed by Supe (1969) and followed by Surendren (2000) was used to measure economic motivation. The scale consisted of four statements of which one is negative. Each statement was provided with five point continuum. The scoring procedure was as follows:

Response	*Strongly Agree*	*Agree*	*Undecided*	*Disagree*	*Strongly Disagree*
Score for positive statements	5	4	3	2	1
Score for negative statements	1	2	3	4	5

The summation of the scores of all the four statements formed the score for economic motivation.

3. 4. 1. 3. 5. Market orientation

The method followed by Geetha (2007) was used in this study. There are five statements of which one is negative. The scoring procedure was as follows:

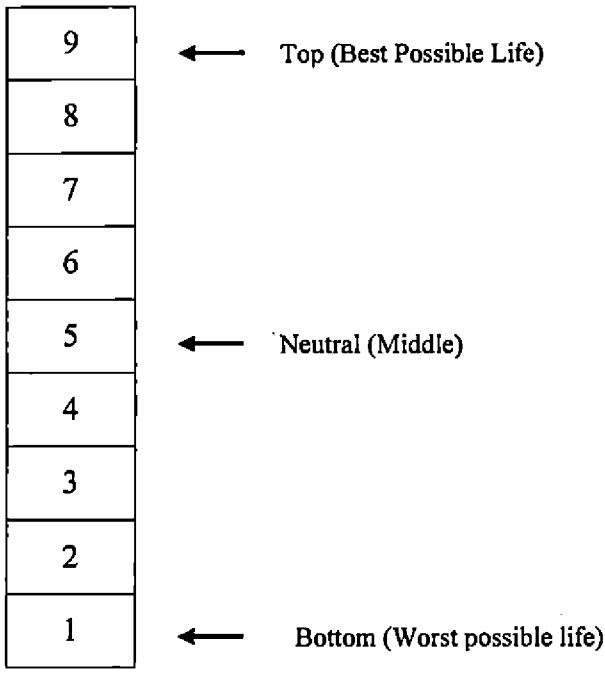
Response	*Agree*	*Disagree*
Score for positive statements	2	1
Score for negative statements	1	2

The summation of the scores of all the five statements formed the score for economic motivation.

3. 4. 1. 3. 6. Level of aspiration

Level of aspiration is operationally defined as the future level of achievement in his job, which he is expecting based on the knowledge about the level of past performance. In this study it was measured using the self anchoring striving scale developed by Cantrill and Free (1962). Accordingly a figure of ladder with nine steps as given below is used. The respondents were asked to indicate the step in the ladder in which they felt as standing at

the time of the study, where they were three years ago and where they would stand three years from the period of the study.



The summed up score was taken as level of aspiration of the respondents.

3. 4. 1. 4. Evaluative perception of socio-technical variables

The variables were selected based upon relevancy rating. Those variables whose relevancy values were above the mean value 3.855 were taken for evaluation of perception of socio technical variables. Accordingly six out of twelve variables were selected. They are given below

Physical compatibility	4.05
Desirability	4.28
Flexibility	4.33
Social acceptability	4.13
Simplicity	4.33
User education	4.19

The variables were measured in appropriate continuum.

3. 4. 1. 4. 1. Physical compatibility

It is the degree to which the technology is perceived as consistent with the infrastructural availability, past experience and needs of the respondent. This was measured in five point continuum with the scores as follows:

	Score
Very compatible	5
Compatible	4
Undecided	3
Not compatible	2
Not at all compatible	1

3. 4. 1. 4. 2. Desirability

It is the degree to which the technology is desired and perceived as worth. This was measured as follows

	Score
Very much	5
Much	4
No opinion	3
Not much	2
Not desired	1

3.4.1.4.3. Flexibility

This is operationalised as the degree to which the technology is characterized by a ready capability to adopt to new alternative or changing requirements or conditions.

	Score
Highly flexible	5
Flexible	4
No opinion	3
Not very flexible	2
Not at all flexible	1

3. 4. 1. 4. 4. Social acceptability

According to Nath (2007) it is the degree to which a technology is considered useful, practical and feasible by majority of the members of the social system. The scoring pattern followed was

	Score
Highly acceptable	5
Acceptable	4
No opinion	3
Not acceptable	2
Not at all acceptable	1

3. 4. 1. 4. 5. Simplicity

It is the degree to which the technology is simple to be adopted by the farmers. The variable is measured using a five point continuum.

	Score
Most simple	5
Simple	4
Neutral	3
Complex	2
Very complex	1

3. 4. 1. 4. 6. User education

UNESCO (1977) defines user education as any effort or programme, which will guide and instruct existing and users, individually or collectively with the objective of facilitating the recognition of their own information needs, the formalization of their needs, the effective and efficient use of information services and the assessment of these services. An arbitrary scale was developed for the study. There were four items and if the response was 'yes' one score was given. If 'no' it was zero for each of the items. The summation of the scores was taken as the score for this variable.

3. 4. 2. Efficiency as perceived by the users.

Efficiency of an ICT is defined by its ability in obtaining information in the right manner. According to Hodge et al., (1984) and Singla (1992) efficiency of information system is explained by variables including timeliness, cost effectiveness and adequacy. But for this study the respondents were asked to state their perception on the efficiency of ICT in agricultural sector. They fall in the following five items.

Gives personalized and timely information

One stop shop information source

Saves time and money in interacting

Has all information the farmer wants

Supports marketing

With respect to every item the respondent perceives as efficient/ will be efficient in his work, one score was given. A maximum of five score is given for perception on efficiency. The total score of each respondent was worked out.

3. 4. 3. Attributes of ICT

A comprehensive list of attributes was collected from various sources. The major sources of references are Prathap (1999) in a study on "An appraisal of existing management information system in district co-operative banks in Kerala", Gupta (1986), Seethanraju, (2006) in a study on "Web quality-a study of user perceptions", Nair, (2004) in his study on "An investigative and evaluative study of factors affecting quality of agricultural and farm information services in Kerala" and finally a study conducted by Kamath,(2003) entitled "A study of Management information systems in the public sector enterprises in Kerala", were taken up.

The information attributes listed by Goyal (1998) and Reynolds (1992) was also included in this study. Each of these attributes has importance collectively and individually in developing any information system to be a successful one. The effectiveness of any information system can be evaluated using these attributes.

From a comprehensive list, 22 attributes were selected and send to the 40 judges and relevancy rating was done. Out of the 40 judges only 21 judges responded. The relevancy rating was done as follows. Relevancy rating was calculated by taking the actual score obtained by each item which was divided by the total number of judges multiplied by 100. The details of the scores are given below.

Relevancy rating of the attributes of ICT

Sl. No.	Particulars		Relevancy rating score Mean 4.29
	Variables selected	Variables sent for rating	
1	Awareness	Availability	4.38
2	Availability	Accessibility	4.43
3	Accessibility	Credibility	4.76
4	Timeliness	Timeliness	4.52
5	Reliability	Reliability	4.62
6	Relevance	Relevance	4.52
7	Credibility	Retrievability	4.76
8	Completeness	Adequacy	4.62
9	Up-to datedness	Accuracy	4.47
10	Multiplier effect-	Explicitness	4.33
11	Cost effectiveness	Format clarity	4.47
12	Non duplication	Non duplication	4.33
13	Exception reporting	Cost effectiveness	4.47
14	Auditability	Interactiveness	4.62
15	Format clarity	Up to dated ness	4.57
16	Capacity building	-	-
17	Retrievability	Completeness	4.19
18	Interactive ness	Multiplier effect-	4.05
19	Affordability	Affordability	3.95
20	Efficiency	Efficiency	4.05
21	Adequacy	Capacity building	3.95
22	Accuracy	Auditability	2.86

. The mean of the values was found out and the variables whose values were above the mean value were selected for the study.

The various attributes of the information kiosks were discussed with the role players concerned. Accordingly 15 attributes of information systems were selected and used for the study. The procedure followed by Nair (2004) was used for the study.

3. 4. 3. 1. Perception on attributes of ICT

Perception is the process where by an individual receives stimuli through various senses and interprets them. Taneja (1989) defines perception as the process of understanding sensation or attaching meaning based on past experience to signs. Perception of the same situation may differ from individual to individual. The perception on attributes of ICT is the degree to which the receiver / respondent perceives the characteristics of ICT to be useful and informative. The variables will be measured by getting the responses from the respondents in appropriate continuum on the following variables. The scoring is as follows.

3. 4. 3. 1. 1. Availability

Availability is operationalised as ICT offered with reasonable proximity and appropriate hardware and software. The scoring procedure was as follows:

The degree of the availability was measured using a five point continuum and the scoring was done as,

Always	5
Sometimes	4
Not sure	3
Don't know	2
Not available	1

3. 4. 3. 1. 2. Accessibility

It refers to the ability to access the ICT. This was measured as follows:

	Score
Always	5

	Score
Located at a distant place	4
Working timing at the centre not suitable	2
Unable to access due to livelihood need/job	3
Not at all accessible	1

3. 4. 3. 1. 3. Credibility

It meant the extent to which a communication source was preferred as trustworthy and important by receivers of the information

3. 4. 3. 1. 4. Timeliness

Brien (1997) defines timeliness as the information provide when it is needed. According to Kamath (2003) it means the quality of information as far as time factor is concerned. For effective decision making timely information is essential.

3. 4. 3. 1. 5. Reliability

Vithal (1988) defines reliability as information free from errors and biases at acceptable degree of confidence.

3. 4. 3. 1. 6. Relevance

Brien (1997) relevance as any information related to the information needs of a specific recipient for specific situation.

3. 4. 3. 1. 7. Retrievability

It is operationalised as the extent to which the information provided in the system can be easily located and received by any user.

3. 4. 3. 1. 8. Adequacy

Vithal (1988) if a report or information delivered covers all related aspects about a particular event or situation it is reporting has adequacy.

3. 4. 3. 1. 9. Accuracy

According to Kamath (2003) any inaccurate information leads to faulty decisions, so accurate information is needed for successful decision making.

3. 4. 3. 1. 10. Explicitness

It refers to the content that does not need further clarification.

3. 4. 3. 1. 11. Format clarity

It refers to the extent to which the information given is in clear format which help the receiver to arrive at a decision.

3. 4. 3. 1. 12. Non redundancy

According to Hogde et al (1984) non redundancy represent non duplication of information. The same information is not stored or communicated using different reports.

3. 4. 3. 1. 13. Cost effectiveness

Chandan (1997) states that cost effectiveness of information is derived when its benefits out weighed its cost of gathering.

3. 4. 3. 1. 14. Interactiveness

It is operationalised as the extent to which the system provides for interacting with the experts, peer groups.

3. 4. 3. 1. 15. Updated-ness

This refers to the currency of information. For all these attributes which include credibility, timeliness, reliability, relevance, retrievability, adequacy, accuracy, explicitness, format clarity, non duplication, cost effectiveness, interactive-ness and up-to-datedness the procedure for measurement is as follows:

All information	5
Most information	4
Many information	3
Some information	2
No information	1

3. 4. 4. Effectiveness

Sangeetha (1999) defines effectiveness as obtaining the right information to promote decision making to achieve the objectives. This was explained by variables such as relevance and reliability (Hodge *et al.*, 1984), non redundancy (Singh, 1992) and exceptional reporting. For the study the effectiveness was explained by including all attributes of ICT.

3. 4. 5. COMMUNICATION BEHAVIOUR

Information seeking

Information storing

Information dissemination

3. 4. 5. 1. Information seeking behaviour

The information seeking behaviour was referred to as the sources or channels from which the respondents got technological information regarding agriculture and the related areas. The respondents were asked to check only those which are applicable to them with

regard to the sources of information, and the content provider. Each checked item was given one score.

a) Source of information — For every response one score is given

b) Content provider — For every response one score is given

c) For the management of the information

Translate on my own	5
Supported by extension agent	4
Engage a third party	3
Accept content only in local language	2
Others specify	1

The sum of the scores for information seeking was taken up as the score for information seeking behaviour.

3. 4. 5. 2. Information storing behaviour

The information storage refers to how the respondent received the messages and how he stored the content in his local languages. The respondents were asked to check those items which are applicable to them. Each item in the case of content received one score was given and for storing in local language the measurement is as follows

All information	5
Most information	4
Many information	3
Some information	2
No information	1

The sum of the score was taken up as the score for information seeking behaviour of the respondent.

3. 4. 5. 3. Information dissemination behaviour.

This variable was measured with reference to the information exchange the respondent had within his community and among other communities and how he shared the message among his fellow members and or groups. The scoring procedure followed was

a) For Exchange of information	*Score*
Yes	4
Not yet but plan to do so in future	3
Can't say	2
No	1

b) Mode of dissemination

Online/Email	5
Telephone/ mobile	4
Letters	3
By word of mouth	2
Don't share	1

3. 4. 6. NEED ASSESSMENT OF THE USERS AND NON-USERS

3. 4.6. 1. Knowledge requirement

It meant the need of knowledge on improved practices and other information realised by the respondent. The scoring procedure followed by Pradeep (2000) for knowledge need was taken up with modifications for the study. For every information need given by the respondent one score was given .The total score of each information, over all the

respondents were worked out and depending on these information wise/ knowledge-wise total scores, the information aspects studied were ranked from one to fourteen.

The information need items include,

Crop cultivation

New varieties and their availability

Market prices of commodities

Manures & Fertilizers

Farm machineries

Plant protection

Organic farming

Bio pesticides

Futures trade

Weather information and forecasts

Bio fertilizers

Vermicomposting

Others

3. 4. 5. 2. Skill requirement

It means that the skill a farmer realises as his requirement to use the ICT for improving his work efficiency. The respondents were asked to state their perception on his skill requirement in making use of the ICT more efficiently. Their responses were listed out. Their responses fall under the following nine items as identified based on review of literature and discussion with experts in the field. They are as follows:

Switch on/off the computers

How to use mouse

How to use keyboard

Knowledge of the websites and read from them

Using key words in retrieving information

How to download files

How to save the required information

How to communicate using emails

How to use search engines

This was measured with a teacher made test used for the study. The details are given in appendix. With respect to every item the respondent perceives as his requirement in his work one score was given .The total score of each item, over all the respondents were worked out and depending on these item-wise total scores, the skill requirement as perceive by the farmers were found out. Perception aspects were ranked from one to nine.

3. 4.7. CONSTRAINTS

The constraints were listed out as perceived by the respondents.

3. 4. 8. SUGGESTIONS

The suggestion as given by the farmers as per their perception was noted down for further improvement of the present system.

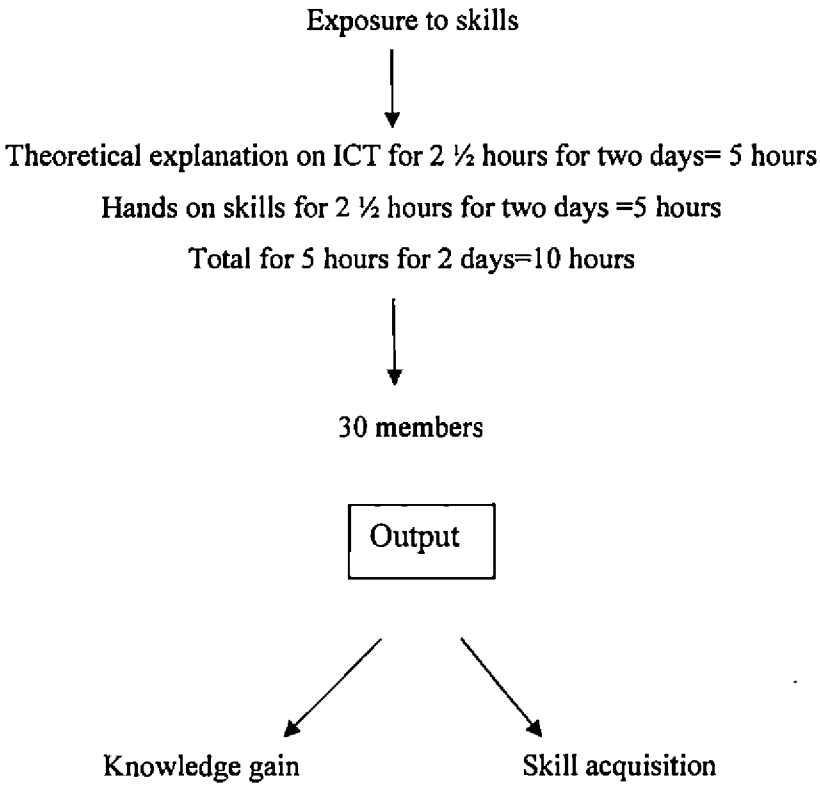
3. 4. 9. ACTION RESEARCH

The second part of the research was action research. Action research is defined by Burns (1990) as the application of fact finding to problem solving in a social situation with a view to improving the quality of action within it , involving the collaboration and co-operation of researchers, practitioners and layman.

According to Adams *et al.,* (2007) it is actively involved in planning and introducing changes in policy and researchers use their research expertise to monitor and possibly to evaluate its effect. It is also sometimes called evaluative research. For this hands on skills to farmers was given and the effect was studied.

The action research was conducted in the form of training on the skills of using computers. The participants for the research were selected by random sampling from the list of non user farmers' interviewed. The initial level of the trainees were considered to be nil for knowledge and skills in using the computers. The farmers were exposed to the skills for five hours for two days i.e., for ten hours each to a group of thirty members.

The diagrammatic representation of the research design is shown below:



The training hours were split into two parts wherein they consist of theory and practical sessions. After theoretical explanation about computers, computer operations were

taught step by step. The subjects were allowed independently to operate the computer and learn from it after teaching the operations.

3. 4. 9. 1. Research design – An abstract

Design of the experiment –	Action research
Selection of respondents-	Simple random sampling
Duration:	10 hours
Theory:	5 hours
Practical:	5 hours
Total number of trainees:	30

To study the influence of training on the non-users observance on their knowledge gain, and skill acquisition at different intervals of the existing ICT facility training was conducted and the effects were studied by documenting the knowledge gain, and skill acquisition at one week, one month and three months interval by the trainees.

3. 4. 9. 1.1. Knowledge gain of the respondents

Knowledge gain was defined as the things known to an individual and represented cognitive domain. The information the respondent gets at different intervals of time was score in a teacher-made test developed for the study. For each information the respondent acquires one score was given. The summed up score was taken up for measuring the knowledge/ information gain.

3. 4. 9. 1. 2. Skill acquisition

Technical correctness was considered for skill acquisition. A teacher made test was developed for the study and the skills were assessed based on their performance. For each exercise the farmer does independently one score was given. This was summed up for the score of skill acquisition.

4. RESULTS AND DISCUSSION

This chapter is organized in order to bring out the salient findings with appropriate discussion. The results are presented in the light of specific objectives set forth in the following order.

4.1. Distribution of respondents with respect to profile characteristics of the respondents including personal, socio psychological, socio economic and socio technical variables.

4.2. Perception on the efficiency of the ICT facility in the respondents' area.

4.3. Comparison of the Communication behaviour between the users and non users.

4. 4. Comparison of communication behaviour between users and non-users by means of ANOVA.

4. 5. Need assessment on the knowledge requirement and skill requirement.

4. 6. Relationship between selected independent variables with the dependent variable based on the responses of the farmers.

4. 7. Relationship of selected independent variables with dependent variables based on the responses of the AOs

4. 8. Comparison of the dependent variables between the users and non users.

4. 9. The results of action research conducted in the study area and evaluation of knowledge gain and skill acquisition after one week, one month and three months after the training.

4.10. Constraints and suggestions as perceived by the respondents.

3. 5. SYLLABUS FOR THE TRAINING

A well designed syllabus ensured the success of training. It included the principles in computer applications, about windows, about MS word, about Microsoft excel and about internet. The training material was prepared in Malayalam and given to the trainees for their future use.

A PowerPoint was prepared in Malayalam in PDF format and presented for explaining the theoretical aspects of the computers and its application in agriculture. The details are given in appendix III.

3.5.1. Leaflet

A leaflet was prepared on how to use the computers and internet in acquiring the information. A copy of the leaflet was circulated among the trainees for their future use. The leaflet is given in appendix IV.

3.5.2. Terms related to agriculture

As this study is the first of its kind in this institution first we have to familiarise with the terms related to the topic. Considering this a detailed collection of the terms related to the topic was collected and presented in appendix I.

3.6. TOOLS AND TECHNIQUES OF DATA COLLECTION

Taking into consideration of the scope and objectives of the study a comprehensive interview schedule was prepared. The schedule consisted of five parts. The pre-testing of the interview schedule was done with 25 respondents selected from non-sample area. Refinement was made in the schedule after pretesting as found necessary and it was finalised before its final administration. Precaution was taken to ensure that the items were clear, concise, complete, comprehensive and unambiguous. Data regarding the profile of respondents, perception about the attributes of ICT, communication behaviour, their information needs and skill acquisition, constraints and suggested strategies were collected

through an interview schedule. . A well structured and pilot tested interview schedule was used for the study (Appendix II). Knowledge gain and skill acquisition was documented at an interval of one week after training one month after training and three months after training.

3. 7. STATISTICAL TOOLS USED

The statistical techniques included parametric and non parametric tools. Simple random sampling is the basic sampling technique where we select a group of subjects (a sample) for study from a larger group (a population). Each individual is chosen entirely by chance and each member of the population has an equal chance of being included in the sample. Every possible sample of a given size has the same chance of selection; i.e. each member of the population is equally likely to be chosen at any stage in the sampling process. The data collected from the respondents were scored, compiled and analyzed using the following statistical tools. Analysis was done at the College of Agriculture, Vellayani.

3. 7. 1. Percentage analysis

The percentage analysis was done to make comparisons wherever necessary. After working out the means and standard deviation of both the dependent and the independent variables the respondents were categorized into different groups. For calculating percentage, the frequency of the concerned cell was divided by the total number of respondents in each category in that cell and multiplied by 100. The percentages were corrected to two decimals.

3. 7. 2. Analysis of variance/ ANOVA

ANOVA is a method of testing the null hypothesis that several group means are equal in the population, by comparing the sample variance estimated from the group means to that estimated within the groups.

3. 7. 3. Pearson's product moment correlation

Pearson's product moment correlation coefficient, usually denoted by r, is one example of a correlation coefficient. It is a measure of the linear association between two variables that have been measured on interval or ratio scales, such as the relationship between height in inches and weight in pounds. However, it can be misleadingly small when there is a relationship between the variables but it is a non-linear one. It is a measure of linear association between two variables. Values of the correlation coefficient range from -1 to 1. The sign of the coefficient indicates the direction of the relationship; its absolute value indicates the strength, with larger absolute values indicating stronger relationships.

3. 7. 4. Paired t-test

It is used to compare means on the same or related subject over time or in differing circumstances. The observed data are from the same subject or from a matched subject and are drawn from a population with a normal distribution. Subjects are often tested in a before-after situation (across time, with some intervention occurring such as a diet), or subjects are paired such as with twins, or with subject as alike as possible. An extension of this test is the repeated measure ANOVA. The paired t-test is actually a test that the differences between the two observations are 0. The test statistic is *t* with n-1 degrees of freedom. If the p-value associated with t is low (< 0.05), there is evidence to reject the null hypothesis. Thus, you would have evidence that there is a difference in means across the paired observations.

RESULTS AND DISCUSSION

4. RESULTS AND DISCUSSION

This chapter is organized in order to bring out the salient findings with appropriate discussion. The results are presented in the light of specific objectives set forth in the following order.

4.1. Distribution of respondents with respect to profile characteristics of the respondents including personal, socio psychological, socio economic and socio technical variables.

4.2. Perception on the efficiency of the ICT facility in the respondents' area.

4.3. Comparison of the Communication behaviour between the users and non users.

4. 4. Comparison of communication behaviour between users and non-users by means of ANOVA.

4. 5. Need assessment on the knowledge requirement and skill requirement.

4. 6. Relationship between selected independent variables with the dependent variable based on the responses of the farmers.

4. 7. Relationship of selected independent variables with dependent variables based on the responses of the AOs

4. 8. Comparison of the dependent variables between the users and non users.

4. 9. The results of action research conducted in the study area and evaluation of knowledge gain and skill acquisition after one week, one month and three months after the training.

4.10. Constraints and suggestions as perceived by the respondents.

4.1. PROFILE CHARACTERISTICS OF THE RESPONDENTS

Profile of the farmers will give a clear picture about the respondent's background, which in turn helps in giving appropriate policy implications based as derived conclusions. The results of the profile and the significance of difference between the respondents of the treatment are given below.

4.1.1. DISTRIBUTION OF RESPONDENTS BASED ON PERSONAL CHARACTERISTICS.

The distribution of the personal variables with respect to the users and non users are given in table 1. It could be observed from table 1 that in both the categories of users and non users, majority of farmers (62.22%) fell under the middle age group. This is in line with the findings of Shibi (2002). The farmers under the user category had a higher percentage of them falling under higher age group compared to the non user group.

Table 1: Distribution of respondents based on age

Age Category	Users (n =180)			Non Users (n = 90)		
	Age	No	Percentage	Age	No	Percentage
Young	<44.36	29	16.11	<41.49	19	21.11
Middle	44.36-60.89	112	62.22	41.49-60.32	56	62.22
Old	> 60.89	39	21.67	>41.49	15	16.67

According to Table.2, majority of farmers in the user and non user categories were male i.e., 79.44 percent and 83.33 percent respectively. This is in line with the findings of Wime (2007). A higher percentage of farmers in user category had education upto SSLC. This was followed by graduation and above. But in the case of non users a majority of them had graduation and above (47.78) as their highest education level. The

reason may be that farming was taken up by the respondents who took up farming as part time occupation or either after retirement.

Fig 1 Distribution of respondents based on exposure to information and communication technology

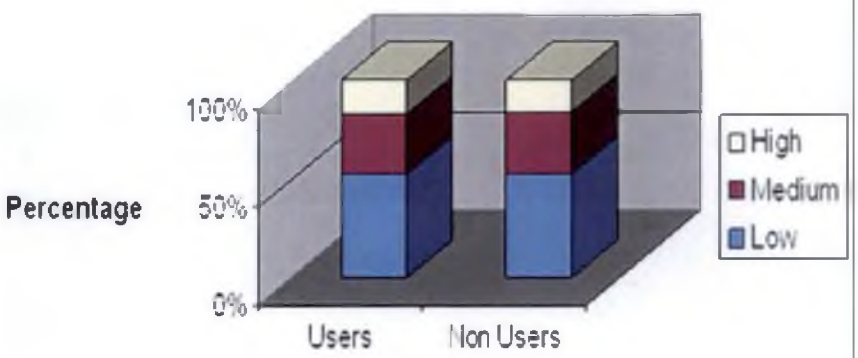


Fig 2 Socio Economic Status of respondents

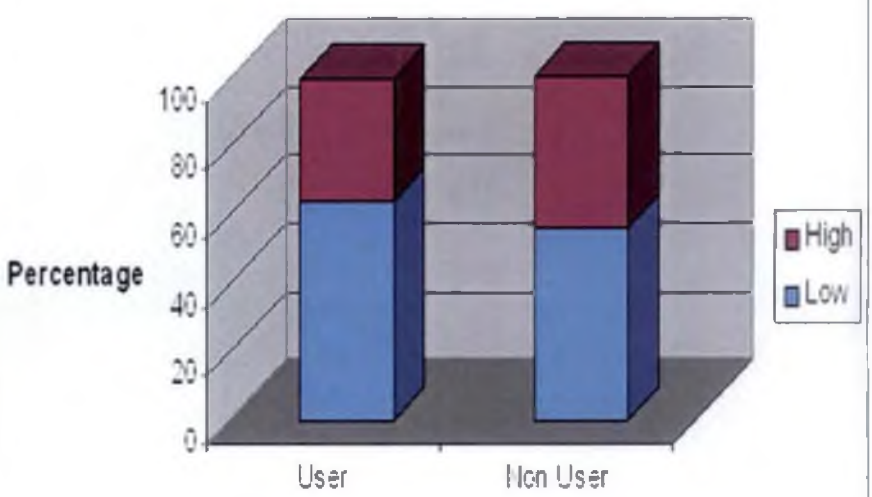


Table 2: Distribution of respondents based on selected independent variables.

S. No	Personal variables	Category	Users		Non Users	
			No	Percentage	No	Percentage
2	Gender	Male	143	79.44	75	83.33
		Female	37	20.55	15	16.67
3	Education	Illiterate	0	0	2	2.22
		SSLC	97	53.88	39	43.33
		Pre-degree	37	20.55	3	3.33
		Diploma	6	3.33	3	3.33
		Graduate and above	46	25.55	43	47.78
4	Farm size(acres)	< 0.5 ac	121	67.22	50	55.56
		0.5 – 1 ac	21	11.67	9	10.00
		> 1 ac	38	21.11	31	34.44
5	Annual Income(Rs.)	< 10,000	10	5.56	12	13.33
		10,001-20,000	27	15.00	4	4.44
		20,001-30,000	67	37.22	14	15.56
		30001–40,000	36	20.00	31	34.44
		> 40001	40	22.22	30	33.33
						100.00
6	Occupation	Farming as a sole occupation	57	31.66	39	43.33
		Farming+ agricultural labour	48	26.66	18	20.00
		Farming + Business	45	25.00	20	22.22
		Farming + service	29	16.11	13	14.44

The table 2 shows that majority of the farmer in both the categories were found to have farm area below 0.5 acres. This was followed by farmers who possess land above one acre. This contradicts with the findings of Kadian and Gupta (2006) and Wime (2007) who states that majority of the respondents had larger land holdings. .

The annual income level of the farmers in user category was found to be maximum between Rs 20000 and 30000 (37.22%). In the non user category the respondents income level was highest in the range of Rs 30000-Rs 40000 (34.44 %) and above Rs. 40000 it was found to be 33.33 percent.

Table 2 also reveals that there is a gradual decrease in the percentage of respondents in taking farming as a sole occupation to farming with after retirement or while in service. Farming and agricultural labour was found to be in a lower range as two panchayats selected for the study are sub-urban areas.

4.1.2. DISTRIBUTION OF RESPONDENTS BASED ON ICT POSSESSION

The abundance of methods for disseminating information creates a need for Extension to know the types of technology its audience owns and/or regularly uses. The Extension Service must be able to provide information that makes a difference. ICTs are tools that help build human network, increase public awareness and provide access to information and knowledge for the use of people. They include Telephone, Fax, GIS, Radio, Television, Print, Internet, Video, Audio, Computer and technologies on the drawing boards. The responses of the users and non-users are given in table 3. It was found that maximum number of respondents had TV which was followed by telephone. Internet connection (13.88 and 2.22 percent) was found to be the least in this list of tools possessed by the farmers. This is shown by Fig 3. Possession of ICT tools by nonusers was found to be higher than the users for TV, radio, telephone and farm magazines. The fig 3 represents this. By ranking the ICT tools possessed by both the users and non users it was found that Television ranked first in both the categories (90.00 % and 98.88% respectively). The ranking of the ICT tools is given in fig. 4. It is seen from the figure

that those tools which topped in possession were found at the center and the least possessed tools are found towards the periphery, in the order of ranking.

Due to the advances in digital technology the dissemination of information to the audiences has become faster than ever before. Many private channels have come to the arena of delivering agricultural and related information to all its audience. Some of the private channels include the Asianet, the Kairali TV, the Jeevan TV and, the Amirtha TV. These channels have attracted a diverse group of audience to view its agriculture related programmes , which is a unique behaviour observed only in Kerala. The cable connection falls next to Telephone connections.

Table No. 3: Distribution of respondents based on ICT possession

ICT possession	Users *n*=180			Non-users n=90		
	No	Percentage	Rank	No	Percentage	Rank
Computer	38	21.11	9	6	6.66	8
Internet connection	25	13.88	10	2	2.22	10
Telephone	155	86.11	2	79	87.77	2
Mobile phone	127	70.55	4	48	53.33	6
TV	162	90.00	1	89	98.88	1
Radio	126	70.00	5	64	71.11	3
Cable connection	133	73.88	3	55	61.11	5
Newspaper	118	65.55	6	56	62.22	4
Farm magazines	60	33.33	7	37	41.11	7
Others specify	42	23.33	8	5	5.55	9

Fig 4 Ranking of ICT Tools based on ICT Posseaaion by users and non users

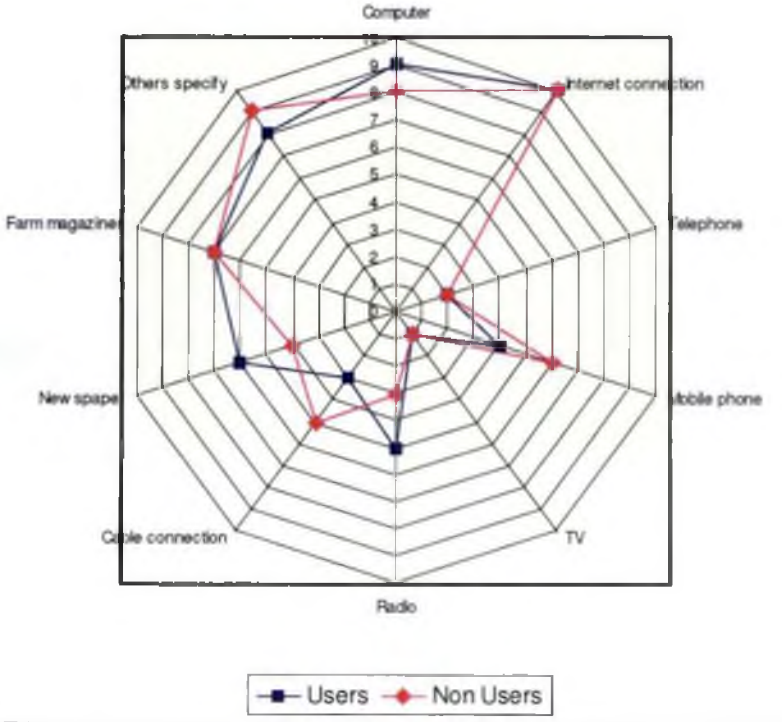


Fig 3 Possession of ICT

The penetration of cable TV networks may be one of the reasons for more number of television sets in these rural areas. Possession of computers by the respondents was found to be 21.11 percent in the user group and 6.66 percent in the non user group. The reason may be that computers are now used for various purposes in addition to agriculture. The internet penetration was also found to be 13.88 percent among users and 2.22 percent among non users. The increase in offers by the internet providers has increased the number of internet penetration in the study area.

4.1.3. DISTRIBUTION OF RESPONDENTS BASED ON THE EXPOSURE TO INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

The percentage distribution of the respondents based on their exposure to ICT showed that in both the categories the majority of the farmers had low level of exposure to internet. The figures are furnished in table 4. Fig.1 shows the distribution of users and non-users base on their exposure to ICT.

Table 4: Distribution of respondents based on the Exposure to Information and Communication Technology (ICT)

Exposure to ICT Category	Users Score	Non Users Score	Users *n*=180		Non-users *n*=90	
			No	Percentage	No	Percentage
Low	< 22	<22.74	94	52.22	47	52.22
Medium	22-30.57	22.74-32.21	56	31.11	29	32.22
High	> 30.57	>32.21	30	16.66	14	15.55

The reason may be that the ICT facility is at a distant place or it may be due to the pressing livelihood needs or jobs of the farmers. Also it may be due to the working timings at the center which does not suit the farmers' time.

4.1.4. PRODUCTIVITY AS PERCEIVED BY THE USERS

The productivity was measured in terms of the degree to which the farmer perceives the increase in yield compared to the previous year. The results are given in table 5. This gives an idea on the extent of the potential use of the ICT facility available in their KrishiBhavan. A majority of the users (35.56%) claim that they slightly agree to the fact that their productivity has increased compared to the previous year. In the case of non users they a majority (34.44%) neither agree nor disagree to the fact that their productivity has increased compared to the previous year.

Table 5: Response of farmers based on their perception on productivity

Productivity	**Users**	***n*=180**	**Non-users**	***n*=90**
	No	%	No	%
Extremely Agree	3	1.67	7	7.78
Agree	11	6.11	9	10.00
Quite Agree	9	5.00	20	22.22
Slightly Agree	64	35.56	14	15.56
Neither Agree nor Disagree	52	28.89	31	34.44
Slightly Disagree	27	15.00	8	8.89
Quite Disagree	10	5.55	1	1.11
Extremely Disagree	4	2.22	0	0.00
Total		100.00		100.00

The increase in productivity indirectly reflected the efficiency of the ICT available in their area. It might have influenced all the stakeholders including the officials who have imparted a good service by helping the farmers in areas wherever needed. But the user respondents' view on productivity is the other way.

4.1.5. DISTRIBUTION OF RESPONDENTS BASED ON SOCIO ECONOMIC STATUS (SES)

The socio-economic status of the farmers included all the independent variables included in the study. The summed up score was categorized in two groups of low and high by calculating the mean score and the results are given below.

Table 6: Distribution of respondents based on their Socio Economic Status (SES)

S No.	Category	User Mean Score =394.21 N= 180		Nonuser Mean score = 397.51 N=90	
		No	%	No	%
1	Low (Below Mean score)	115	63.89	50	55.56
2	High (Above Mean score)	65	36.11	40	44.44

Table 6 shows that majority of the people in both the categories fall under the low socio economic status. The highest score in the user group was found to be 1071 user group and 835in non user group and the lowest being 191 and 168 respectively. This is represented in fig. 2.

A vast difference may have occurred in the income level of the respondents as this is the only source of income to the farmers. In the case of users and non users, a majority (63.89% and 55.56%) had low level of socio economic status.

4.1.6. DISTRIBUTION OF RESPONDENTS BASED ON SOCIO PERSONAL, SOCIO ECONOMIC AND SOCIO PSYCHOLOGICAL CHARACTERISTICS

The socio personal characteristics of the respondents included age, gender, education, occupation, experience, social participation, extension agency contact, cosmopoliteness and exposure to ICT.

Fig. 5 . Distribution of respondents based on socio personal characteristics

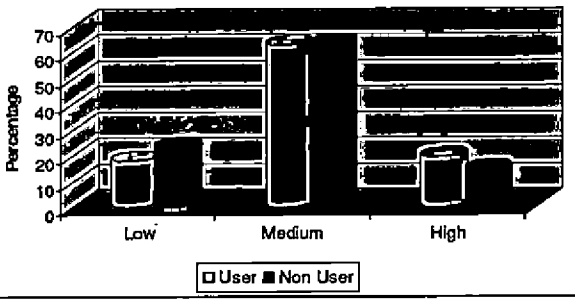


Fig. 6 . Distribution of respondents based on socio economic characteristics

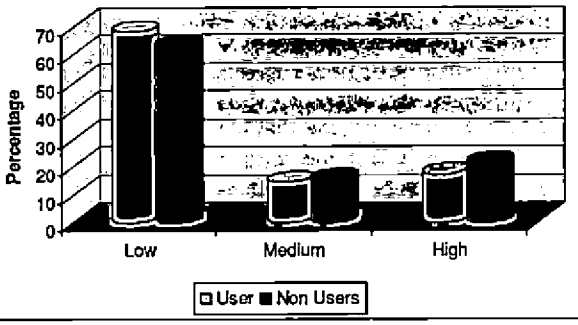


Fig. 7 Distribution of respondents based on Socio psychological characteristics

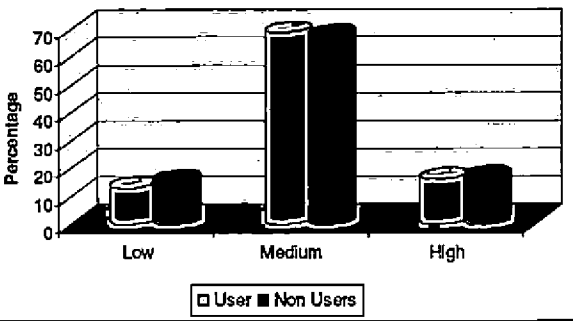


Fig. 8 Distribution of respondents based on socio technical characteristics

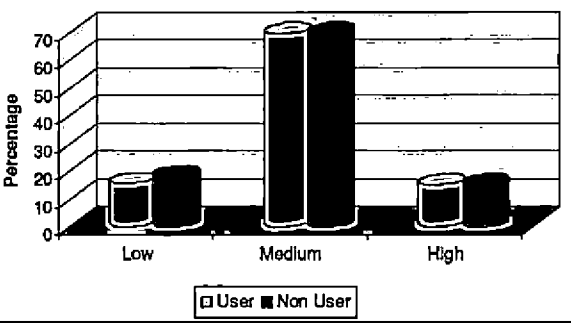


Table 7: Distribution of respondents based on socio personal, socio economic and socio psychological characteristics

Socio personal				
Category	Users *n*=180		Non-users *n*=90	
	No	Percentage	No	Percentage
Low	32	17.78	21	23.33
Medium	113	62.78	56	63.22
High	35	19.44	13	14.44
Socio economic				
Low	123	63.33	57	63.33
Medium	26	14.44	14	15.55
High	41	17.22	19	21.11
Socio psychological				
Low	23	12.78	14	15.56
Medium	124	68.89	61	67.78
High	29	16.11	14	16.67

It is found from that table that most of the respondent in both the categories had medium level of socio personal characteristics. It was also found to be similar in socio psychological and socio technical behaviour.

In the case of socio economic variable the scores of annual income area and ICT possession was summed up and calculations were done to categorize the variable. The variables innovativeness, scientific orientation, economic motivation, market orientation and level of aspiration were summed up for the score of socio psychological variable. The details are given in table 7.

In the case of socio economic characteristics majority of the respondents fell under low category. This is represented in figure 5, 6, 7 and 8.

The profile characters of the respondents was found to be homogenous in nature which implied that the group selected for this study were by and large similar in the vital characters and thereby provided adequate strength to this study.

4.1.7. DISTRIBUTION OF THE RESPONDENTS BASED ON THE MEAN SCORE ON SOCIO TECHNICAL VARIABLES

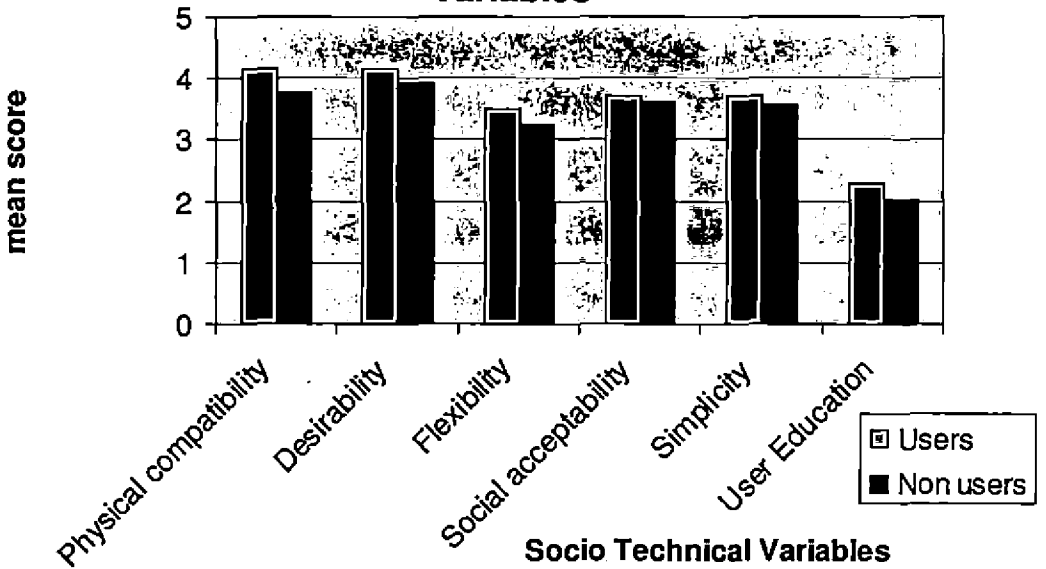
Table 8. shows the mean score obtained for the socio technical variables by the users and non users. The mean values were found to be maximum for users compared to non users. The reason may be that they have a higher perception on the potentials of the ICT.

The mean of the socio technical variables was found to be the maximum for physical compatibility and desirability in the case of users. This was followed by social acceptability and simplicity. In the case of non users the range was 3.91 to 2.01. It showed desirability as the maximum. This was followed by physical compatibility and social acceptability. In both the cases user education had the minimum score. So this area needs more attention.

Table 8: Distribution of respondents based on the mean score on socio technical variables

S. No.	Socio Technical Variables	Users Mean score	Non users Mean score
1	Physical compatibility	4.16	3.76
2	Desirability	4.16	3.91
3	Flexibility	3.49	3.24
4	Social acceptability	3.71	3.61
5	Simplicity	3.70	3.54
6	User Education	2.28	2.01

Fig 9 Perception on Socio Technical variables



It is found from the table.8. that the socio technical variables of the users are slightly higher than the non users. This is represented by fig. 9. The reason may be that they have a better idea about the ICT facility in their area and also knew the benefits of it. The socio technical behaviour of the respondents is given in table 9 categorizes the users and non users into three. It was found that majority of the users and non users had medium level of this behaviour. Fig. 9 gives the socio technical behaviour of each item. The figure shows that this behaviour is found to be higher among the users.

Table 9. Distribution of respondents based on the Socio technical behaviour

Category	Users *n*=180		Non-users *n*=90	
	No	Percentage	No	Percentage
Low	28	15.56	16	17.78
Medium	125	69.44	58	69.44
High	27	15.00	16	17.78

The table 9 shows that in both the cases the majority of the respondents have medium level of perception on this behaviour. In the non user category has a higher percentage falling under high behaviour. The reason may be that the users feel the setbacks in the systems which reflect on the behaviour.

4.2. EFFICIENCY AS PERCEIVED BY THE FARMERS

Understanding the factors which influence the adoption and use of Information Technology by individuals is one of the important issues which continue to interest Information Systems researchers. If an information system is not used, it can not improve the efficiency or effectiveness of an individual.

From the table 10 we learn that the maximum response on the efficiency of the ICT were on saving time and money in interacting in both users and non users and has all information the farmer wants in the nonuser category. This was followed by one stop shop information by the users and supports marketing in the case of non users

Table 10: Efficiency as perceived by the farmers

Efficiency perception	Users *n*=180		Non-users *n*=90	
	No	Percentage	No	Percentage
1. Gives personalized and timely information	11	6.11	4	4.44
2. One stop shop information source	41	22.77	8	8.89
3. Saves time and money in interacting	83	46.11	34	37.78
4. Has all information the farmer wants	39	21.67	34	37.78
5. Supports marketing	6	3.33	10	11.11
Total				100.00

. This is represented in fig. 10 and fig. 11. We can infer that the farmers in both the categories need timely information in all aspects with less cost.

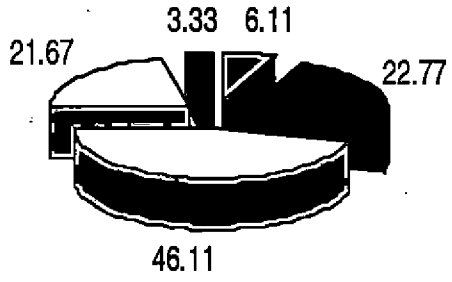
4. 3. COMMUNICATION BEHAVIOUR OF THE USERS AND NON USERS

An effective communication is the soul of extension education which evoke desirable changes in the attitude and behaviour of both communicators and receivers. Possession of rich knowledge base is fundamental in making appropriate timely decisions in farming. An attempt has been made in this investigation to examine the communication behaviour of the farmers and the results are furnished below.

Table 11: Mean score of communication behaviour of Users and Non-users.

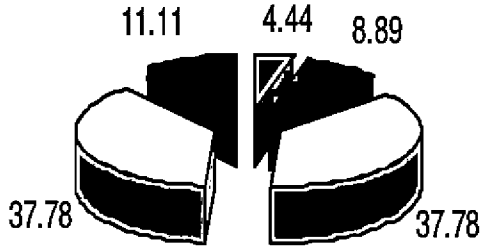
Panchayats	Users *n*=180	Non-users *n*=90
Kudapanakunnu	23.82	15.53
Ulloor	22.78	15.27
Nedumangad	23.28	14.90

Fig 10 Efficiency as percieved by Users



- Gives personalised and timely information
- One stop shop information source
- saves time and money in interacting
- has all information the farmer wants
- supports marketing

Fig 11 Efficiency as percieved by Non Users



- Gives personalised and timely information
- One stop shop information source
- saves time and money in interacting
- has all information the farmer wants
- supports marketing

Based on the mean scores we can infer than the communication behaviour of the users were uniform in all the three panchayats. It was also found to be uniform in the non user category also.

4. 4. COMPARISON OF COMMUNICATION BEHAVIOUR BETWEEN USERS AND NON-USERS BY MEANS OF ANOVA.

A comparison of the communication behaviour of both the users and non users was done using ANOVA and the results are given in the following table 11. Based on the mean values of the users and the non-users we can infer that there is a difference in the communication behaviour between them. This is further confirmed by the results of ANOVA which is given in table 11. The F Value was found to be 83.6625 which mean that it is highly significant. So we can infer that there existed some difference in the communication behaviour of users and nonusers.

Table 12. Comparison of communication behaviour of Users and Non Users

Communication Behaviour						
ANOVA: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Users	180	4193	23.29444	13.31505		
Non Users	90	1371	15.23333	3.821348		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	3898.891	1	3898.891	383.6625**	1.24E-53	3.876394
Within Groups	2723.494	268	10.16229			
Total	6622.385	269				

4. 5. NEED ASSESSMENT ON THE KNOWLEDGE REQUIREMENT AND SKILL REQUIREMENT

The development of appropriate technologies and delivering them to farmers is an important phenomenon in extension. Extension conducts periodic needs assessments among typical historic audiences and among potentially new audiences for the purpose of setting programming priorities and allocating resources and services. A need assessment can help Extension educators to decide whether an extension program should be improved and how the services should be better delivered. One of the objectives of our research was to identify the needs of both the users and non users within the study area.

4. 5. 1. Knowledge requirement of farmers

Before we can assess how effective the existing information kiosks are at delivering appropriate information and knowledge, we need to know what farmers' main information or knowledge needs are. Providers of information may have different ideas about those needs than farmers. Identifying any differences can help information providers to become more responsive to the needs and demands of farmers. Knowledge of farmers regarding agriculture and related aspects is a key component in the contribution of development in this sector. Information communication technologies are providing timely and useful information on subjects ranging from market prices to future trade. Many in the community do not have individual access to these technologies but the information kiosks provided shared access. Before we can assess how effective the existing ICT is at delivering appropriate information and knowledge, we need to know what farmers' main information and skill needs are. For this a detailed study on the knowledge requirement of the farmers was studied and the results are furnished in table No. 4.4.1. Identifying any differences can help information providers to become more responsive to the needs and demands of farmers.

The knowledge requirement of the farmers was collected and the responses were given in table 13. The information needs of the respondents were numerous. The results

show that they needed information on agriculture such as market rates, bio pesticides, bio fertilizers. These areas ranked top in their information needs. This was followed by organic farming, plant protection and cropping practices.

Table 13: Distribution of farmers based on Knowledge requirement

S. No	Information/ knowledge need	Users *n*=180			Non-users *n*=90		
		No	%	Rank	No	%	Rank
1.	Cropping practices	96	53.33	6	54	60.00	5
2.	Crop varieties	83	46.11	8	48	53.33	7
3.	Market rates of commodities	151	83.89	1	78	86.67	1
4.	Manures an fertilizers availability	41	22.78	10	34	37.78	9
5.	Farm machineries	59	32.78	9	27	30.00	10
6.	Plant protection	109	60.56	5	56	62.22	3
7.	Organic farming	115	63.89	4	57	63.33	2
8.	Bio pesticides	129	71.67	2	54	60.00	5
9.	Futures trade	23	12.78	12	15	16.67	12
10.	Weather	33	18.33	11	20	22.22	11
11.	Bio fertilizers	117	65.00	3	56	62.22	3
12.	Vermi composting	87	48.33	7	47	52.22	8
13.	Others	6	3.33	13	5	5.56	13

Fig 12 Information Need of farmers

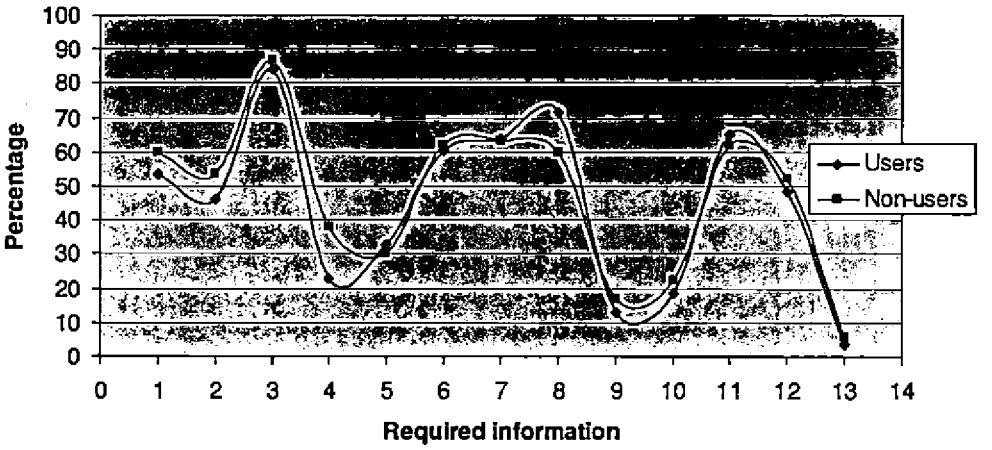
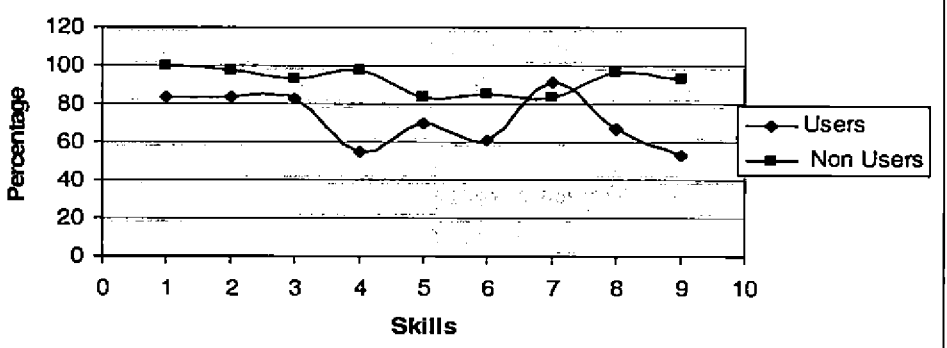


Fig 13 Skill Requirement of farmers



The Fig. 12 shows that there is not much difference in the information need of the users and non users. In the case of information on bio pesticides and bio fertilizers the non users' requirement on these information were found to be more than the non users. In the figure the blue line shows the non users need and the pink line shows the users need. The figure shows a similarity in the information need of both the categories

4. 5. 2. Skill requirement

In order to hasten the utilization of communication network by the farmers building up the skills and tools are necessary in making use of the existing facility. For this first we have to find out the skill requirements of the respondents. The requirements were collected based on the responses under nine items and their frequencies were found out. The details are given in table 14. It is found from the table that the farmers required skills in all the aspects of using the kiosks. In the case of user farmers 'saving the required information for future use' ranked first. This was followed by 'how to use mouse and switch on/off the computers'.

Table 14: Distribution of farmers based on Skill requirement

S. No	Skill requirement	Users		*n*=180	Non-users		*n*=90
		No	%	Rank	No	%	Rank
1	Switch on/off the computers	150	83.33	3	90	100.00	1
2	How to use mouse	151	83.88	2	88	97.77	2
3	How to use keyboard	149	82.77	4	84	93.33	5
4	Exposure to the website	98	54.44	8	88	97.88	2
5	Using key words in retrieving information	125	69.44	5	75	83.33	8
6	How to download files	110	61.11	7	77	85.55	7
7	How to save the required information	165	91.66	1	75	83.33	8
8	How to communicate using emails	121	67.22	6	87	96.66	4
9	How to use search engines	96	53.33	9	84	93.33	5

Plate . 2. The researcher presenting about applications of ICT in agriculture

Plate . 3. The farmer examining his SRI rice crop

But in the case on non users switch on-off ranked first followed by how to use mouse and exposure to websites. This table shows that the non user farmers required all skills right from the very basic aspects of computers. This is the major area which the farmers required in getting benefited by the kiosks. This area requires due care which has to be made in bringing about changes in the agricultural sector to harvest the benefits of the facility in the area. The Fig. 13 shows that the skill requirement of the non users' farmers was more than the user farmers. The pink line denotes this. Also in the case how to save the information was the most required skill requirement of the user farmers. This is denoted in the figure by the blue line.

4. 6. RELATIONSHIP BETWEEN SELECTED INDEPENDENT VARIABLES WITH THE DEPENDENT VARIABLE BASED ON THE RESPONSES OF THE FARMERS.

It is evident from the table 15 that the socio economic status had positive and high significance with socio technical perception and communication behaviour. The attributes perception and communication behaviour also had positive significance at 5 percent level. But all the other variables were found to be non significant with each other in the case of users.

This infers that when the socio economic status of the farmers increased the socio technical behaviour also increased. The communication behaviour was found to be highly significant with the socio economic status of the farmers which clearly denotes that when the socio economic status increased the communication behaviour of the users also increased. . The communication behaviour and the attributes of ICT were found to be positive and significant.

Table 15: Correlation between selected independent variables and dependent variables of the users

(Users n=180)

Variables	Socio technical perception	Socio Economic Status	Attributes	Comm-unication behaviour	Inform-ation need	Skill requirement
Socio technical perception	1					
Socio Economic Status	0.2217**	1				
Attributes	-0.0093	-0.0090	1			
Comm-unication behaviour	-0.0599	0.2418**	0.1647*	1		
Inform-ation need	-0.1421	-0.0242	0.0934	0.1200	1	
Skill requirement	0.1079	0.1286	-0.0983	0.0367	0.0949	1

So it is evident that the users had perceived some kind of benefits they had or would achieve in future. According to table 16 it was found that none of the selected variables in the case of nonusers showed significance when correlated using Pearson product moment correlation.

Table 16: Correlation between selected independent variables with the dependent variables of the non users

n =90

Variables	Socio technical perception	Socio Economic Status	Attributes	Comm-unication behaviour	Information need	Skill requirement
Socio technical perception	1					
Socio Economic Status	0.0833	1				
Attributes	0.0833	0.0485	1			
Comm-unication behaviour	0.0944	0.0944	-0.0692	1		
Information need	-0.0447	-0.1056	0.01876	-0.0939	1	
Skill requirement	-0.1198	-0.1198	0.1058	-0.0969	0.1085	1

All the variables were found to be non significant in the case of non –users. The reason may be that their need for information and knowledge may be very low or they did not want to learn more from the Krishibhavans.

4. 7. RELATIONSHIP OF SELECTED INDEPENDENT VARIABLES WITH DEPENDENT VARIABLES BASED ON THE RESPONSES OF THE AGRICULTURAL OFFICERS (AOs)

The key role in information dissemination is played by the agricultural officers in the study area. They were interviewed for the attributes of ICT, their information need and their skill requirement and the relationship was found out using Pearson correlation.

Plate 4. The trainee browsing for agricultural information in the kiosk

Plate 5. The trainee examining for pests in her vegetable crop

Table 17: Relationship of the selected independent variables of the AOs with the dependent variables

n=10

S. No.	Variables	Attributes	Communication behaviour	Information need	Skill requirement
1.	Age	-0.4326	-0.2392	-0.2392	-0.0170
2.	Gender	-0.0340	-0.1353	-0.2182	0.4426
3.	ICT possession	0.4333	0.4164	0.5384	-0.1193
4.	Exposure to ICT	0.6149	0.3592	0.4369	-0.2770
5.	Socio technical behaviour	0.7779**	0.5969	0.7448**	-0.4180
6.	Productivity	0.6054	0.6749*	0.6262*	-0.4451

* Significant at 5 %, ** Significant at 1%

The perception on attributes of ICT showed negative significance with age. So as and when the age increased the perception about the characteristics of ICT decreased. ICT possession and exposure to ICT showed non significance. The reason may be that they were not satisfied with the ICT facility in there area. This may be due to the additional responsibility they fear in supporting the farmers in acquiring the skills and knowledge with the help of ICT. The communication behaviour and information need was found to be significant with productivity. The socio technical behaviour and information need was found to be significant. The reason may be that the farmers' needs are getting diversified but the flow of information to the extension system is slow. So they might feel that if they have higher information need they acquire more knowledge and thereby their productivity might increase.

Table 18. Correlation between the dependent variables based on the responses of the AOs.

n=10

S. No.	Variables	Attributes	Communication behaviour	Information need	Skill requirement
1.	Efficiency	0.8063**	0.742554*	0.620174**	-0.22198
2.	Attributes	1			
3.	Communication behaviour	0.7635**	1		
4.	Information need	0.7163**	0.7047**	1	
5.	Skill requirement	-0.1442	-0.0481	-0.4451	1

Skill requirement was non significant with all these variables. The reason may be that the AOs did not feel that they need skills in using the facility. More over they also might have felt that improving ICT skills will in some way improve their present nature of work. .

4. 8. COMPARISON OF THE DEPENDENT VARIABLES BETWEEN THE USERS AND NON USERS.

Comparison of the dependent variables between the users and non-users were analysed using ANOVA and the results are given below.

4. 8. 1. Comparison of the respondents based on their perception about the attributes of ICT

The table 19. reveals that all variables except for information need are highly significant. This shows that the user farmers' perception on the attributes is higher than the non users.

Table 19. Comparison of the respondents based on their perception about the dependent variables.

S. No.	Variables	Users n=180	Non-users n=90	F value
1	Attributes as perceived by the farmers	53.86	49.50	17.96**
2	Communication behaviour	23.39	15.23	383.66**
3	Information need	5.66	6.07	2.27 NS
4	Skill Requirement	6.49	8.31	53.06**
5	Efficiency as perceived by the farmers	2.96	3.42	14.32**

** Highly Significant Critical value= 3.87

The communication behaviour showed very high significance. But for information need it was found to be non significant. The reason may be that the user farmers had higher information need than the non user farmers as they lack in knowledge acquisition from the kiosks. The need for information might have prompted them to make use of the facility available in their area. The perception on efficiency by non users was found to be higher than the users.

4. 9. ACTION RESEARCH

The need assessment of the farmers gave a clear picture about the respondent's background which in turn helped to give an appropriate strategy for developing a training programme for the farmers based on derived conclusions. The training was conducted at Kudappanakunnu Krishi Bhavan on 23rd and 24th June 2008. The detailed report on training is given in appendix V. The results on the effect of training were score using a teacher made test and the scores were summed up for and analysis was done using Pearson 'r ' product moment correlation and Paired 't' test and the results are as follows.

4. 9. 1. Relationship of Independent variables with knowledge gain and skill requirement.

The relationship of knowledge gain and skill requirement was studied using Pearson product moment correlation and the 'r' values.

4. 9. 2. Relationship of Independent variable of the trainee farmers with knowledge gain

The relationships of selected independent variables were correlated with the knowledge gain score and the results are furnished below in Table 20.

The relationship was found to be negative and significant for occupation at 5 percent level of significance. The respondents showed a negative significance at one percent level for risk orientation and market orientation.

The communication behaviour was found to be positive and highly significant at 0.001% and also for information need. So we can infer from the table that these variables have relationship with the gain in knowledge. The respondents had need for information which prompted them to search for more information which was reflected in the knowledge gain score.

The variables risk orientation and market orientations were found to be negative and highly significant, communication behaviour and information need was found to be positive and highly significant. Occupation was found to be negative and significant at one percent level.

Table 20: Relationship of Independent variable of the trainee farmers with knowledge gain

n=30

S. No	Variable	Knowledge gain
1.	Age	-0.2267 NS
2.	Gender	0.1334 NS
3.	Education	-0.03675 NS
4.	Income	-0.0607 NS
5.	Occupation	-0.3151*
6.	ICT possession	0.0464 NS
7.	Exposure to ICT	-0.0811 NS
8.	Risk orientation	-0.3753**
9.	Scientific Orientation	-0.1197 NS
10.	Economic Motivation	-0.3146 NS
11.	Market Orientation	-0.3807**
12.	Level of Aspiration	-0.0982 NS
13.	Socio technical behaviour	-0.2128 NS
14.	SES	-0.1805 NS
15.	Efficiency perception	0.0460 NS
16.	Productivity perception	-0.0945 NS
17.	Attributes perception	-0.1300 NS
18.	Communication behaviour	0.5534**
19.	Information need	0.5583**
20.	Skill requirement	0.0102 NS

NS non significant, * Significant @ 5% and ** Significant @1%

4. 9. 3. Relationship of Independent variables of the trainee farmers with Skill acquisition

The relationship of selected independent variables was correlated with the Skill acquisition score using Pearson r correlation and the results are furnished below in table 21. Skill acquisition showed negative significance with economic motivation at 5% level and market orientation at 1% level. But it was positive and highly significant @ 0.01 % for information need and @ 0.001 % for knowledge gain. The information need and the requirement for knowledge may be the reasons for its close association with skill acquisition.

Table 21: Relationship of Independent variable with Skill acquisition n=30

S . No	Variable	Skill Acquisition
1.	Age	-0.2195 NS
2.	Gender	0.1843 NS
3.	Education	0.0742 NS
4.	Income	0.0211 NS
5.	Occupation	-0.2155 NS
6.	ICT possession	0.1547 NS
7.	Exposure to ICT	0.0206 NS
8.	Risk orientation	-0.2672 NS
9.	Scientific Orientation	-0.0851 NS
10.	Economic Motivation	-0.32057*
11.	Market Orientation	-0.43045**
12.	Level of Aspiration	-0.0553 NS
13.	Socio technical behaviour	-0.1006
14.	SES	-0.0978 NS
15.	Efficiency perception	0.0499 NS
16.	Productivity perception	0.1425 NS
17.	Attributes perception	-0.2189 NS
18.	Communication behaviour	0.2105 NS
19.	Information need	0.4716**

S . No	Variable	Skill Acquisition
20.	Skill requirement	0.0624 NS
21.	Knowledge gain	0.8991**

* Significant @ 5 %, ** Significant @ 1%

The Skill Requirement was found to be non significant with skill acquisition. The reason is that the farmers need for skills was very high. They required skills in all the aspects. Their skill acquisition was not as high as expected. The reason may be that they lack in some areas of skills like retrieving of information, using search engines and emailing. These areas need to be attended, to make them acquire skills in making the facility effective in all ways possible.

4. 9. 4. Paired t test

Paired t test was used to compare means on the same subject over time. Subjects are often tested in a situation across time, with some intervention occurring. The paired t-test is actually a test that the differences between the two observations are 0. The test statistic is *t* with (30-1) 29 degrees of freedom. The t-value was found out and the details are given in the table 22 and 23.

4. 9. 4. 1. Evaluation of Change in knowledge by the trainees using Paired t test.

The knowledge gain of the farmers in three intervals, one week, one month and three months after the training was found out based upon their responses and they were grouped under thirteen headings and mean and t value was found out.

The mean value was found to be in the increasing order from one week to three months period. The t value was found to be highly significant in all the three cases. The results in table 22. revealed that there was a constant change from one week after the training to three months after the training. This reflected the effect of training thereby the efficiency of ICT in the benefit of the farmers.

Table 22 : Paired t test on knowledge gain by the non-users

n=30

S . No	Paired t test between	t Value
1.	Knowledge gain at one week after training and one month after training	4.32*
2	Knowledge gain at one month after training and three months after training	12.06**
3	Knowledge gain at three months after training and three months after training	12.50**

** Significant Critical value = 2.045

4. 9. 4. 2. Evaluation of skill acquisition by the trainees using Paired t test

The skill acquisition of the farmers were found out by summing up their skill acquisition in nine major skills as identified as their need by the farmers and the scores were tested with paired t test. The results are given in table. 23. The table also gives the mean value of the scores obtained. The mean scores were found to be in the increasing order from one week to three months interval.

Table 23: Paired t test on skill acquisition by the non-users

S . No	Paired t test between	t Value
1.	Skill acquisition at one week after training and one month after training	7.22**
2	Skill acquisition at one month after training and three months after training	12.57**
3	Skill acquisition at three months after training and three months after training	6.52**

** Significant Critical value = 2.045

The results when tested gave a highly significant value for skill acquisition at one week after training and one month after training, one week after training and three months after training and one month after training and three months after training. This shows that the training had its effect in bringing about changes in skill acquisition by the farmers.

Hence the paired 't' test on the effect of training showed that there is a change from the initial level to the final level which means that when we fill in the gap needed in any service given to the farmers it will bring the service to effective condition. In that way we can say that when we impart training to the farmers on the skills in acquiring information it will in turn bring about desirable changes in the farmers.

4.10. CONSTRAINTS AND SUGGESTIONS AS PERCEIVED BY THE RESPONDENTS

A main barrier to achieving the functioning of this system lies in the extent to which the project meets the growing expectations of the farmers. The great expectation among the farmers is that the centers will promote market related activities. To meet citizen expectations, then, will require cooperation from individual government departments. The farmers themselves had given the constraints as perceived by them. Also they have given some suggestions in making the system better. They are listed below.

4. 10. 1. Constraints as perceived by the respondents

The constraints perceived by the farmers were listed out and they are given below in table No. 24. It was found that lack of skills in using the facility is the most felt constraint by the farmers. This was followed by the content in other language. The third position was given for lack of awareness.

Table No. 24. Constraints as perceived by the respondents.

n= 270

S. No.	Constraints	No	Percentage	Rank
1.	Unperceived economic or other benefits by the farmers	160	59.26	VII
2.	Lack of awareness	169	62.59	III
3.	Personal impediments prevent in using the facility	155	57.41	VIII
4.	Maintenance of the available facility	157	58.11	VI
5.	The system is too hard to use/ unfriendly	168	62.22	IV
6.	Other alternatives are easily available	167	61.85	V
7.	Users lack skills in using the facility	176	65.19	I
8.	Mostly the content is in other language, English	173	64.07	II

4. 10. 2. Suggestions as given by the farmers

For improvement in any service sector the suggestions should come from the user end. In this regard an attempt was made to find out the suggestions given by the farmers in improving the existing system. The suggestions as given by the farmers were listed and given below.

1. Care should be taken that the contents are in local languages and that it is useful even to illiterate farmers.

2. Scheduled video conferencing can be arranged by the concerned institutions to provide expert advices to the farmers.
3. More number of trainings on skills can be conducted to widen the user-base.
4. The centers should provide multiple services to farmers so that it can be made more functional on participatory basis
5. Suitable mechanisms need to be developed for the creation of location specific knowledge capsules.

A detailed study on the various aspects of the ICT facility available in the study area was done and the results were given. But still there are certain areas which need attention. This study will serve as a foundation stone for such type of studies.

SUMMARY AND CONCLUSION

5. SUMMARY AND CONCLUSION

The application of Information Communication Technology (ICT), dissemination and capacity to integrate and absorb human knowledge has grown immensely. The Internet and related technology facilitated the flow of information and knowledge and made it accessible to people at minimum cost and helped establish knowledge based society. Sharing of knowledge as a factor of production contributes significantly for the economic development and growth of a country. Over the last few years, many nations in the region has made remarkable achievement in the socio-economic development of the country exploiting full advantage of ICT containing this within their national development policy framework. India is committed to become an ICT driven nation and envisages ensuring accessibility of ICT and internet services to the entire citizen for equitable and sustainable development. In spite of the successful researches in new agricultural practices, the majority of farmers are not getting upper bound yield due to several reasons. One major reason is that expert advice is not reaching the faming community in a timely manner. The human family is now facing formidable development challenges.

The fast changing scenario of agriculture calls for the revitalization of the extension system so as to make effective transfer of technology. Agricultural Information Delivery System (AgIDS) acts as a highway in getting the quickest and reliable up to date information from any corner of the earth. It has started to make the pressure felt in rural India.

Although the potential advantages of information systems over the conventional methods of information dissemination were recognized in the late eighties they were seldom effectively exploited. So AgIDS should be made accessible, particularly, to those

with specific inquiries to guide them in adopting the more knowledge intensive forms of agriculture, which will expand in future. The present study attempts to examine the various aspects of Information and Communication Technology (ICT) in Kerala. The main objectives of the study are to analyze the efficiency of the existing Information Communication Technology (ICT) viz., the information kiosks by studying its influence on the knowledge of the users and the non users. The study also aims at identifying the constraints and to elicit suggestions for improving the efficiency of information kiosks. More specifically

1. To study attributes of ICT and to find out the effectiveness of ICT.
2. Need assessment of ICT in Kerala with regard to information and skills
3. To compare the communication behaviour of the users and non-users of information communication technology.
4. To study on the knowledge gained by the non-users subjected to training, at different intervals.
5. Documentation on the knowledge gain, frequency of use and perceived improvement in use at different intervals -one week, on month and three months after the training.

Thiruvananthapuram district has been purposively selected for the study because this is the only district in Kerala having information kiosks being operated in the krishibhavans. From the ten krishibhavans three krishibhavans were selected based on the maximum numbers of users of ICT. Accordingly Kudappanakunnu, Ulloor and Nedumangad panchayats were selected for the study. The design of research is expose facto research. The dependent variables were selected based on relevancy rating. The need assessment on information need and skill requirement was assessed. Accordingly the training was planned and implemented at Kudappanakunnu krishibhavan for 30 farmers. And the results were documented. Communication behaviour was one dependent variable. Other variables

include perception on the attributes of ICT. The efficiency as perceived by the respondents was collected. All these data were collected using a well structured interview schedule and each respondent was personally interviewed by the investigator. The data were subjected to various statistical analyses such as correlation, analysis of variance and paired 't' test. The salient findings of the study are summarised below.

1. In both the categories of users and non user farmers' majority of farmers (62.22%) fell under the middle age group. fall under the age between 44 and 60 years.

2. Majority of farmers in the user and non user categories were male i.e., 79.44 percent and 83.33 percent respectively. in both the category were male.

3. A higher percentage of farmers in user category had SSLC (53.88%) as their highest education. But in the case of non users a majority of them had graduation and above (47.78%) as their highest education level.

4. Maximum number of respondents in both the category of users and non-users had TV which was followed by telephone. Internet connection (13.88% and 2.22 %) was found to be the least in this list of tools possessed by the farmers. In ICT possession it was found that Television ranked first in both the categories. Possession of computers by the respondents was found to be low in both the groups and the lowest is internet connection. Possession of ICT tools by nonusers was found to be higher than the users for TV, radio, telephone and farm magazines.

5. Majority of the farmers had low level of exposure to ICT in both the categories (52.22% each).

6. The SES of the respondents according to the table reveals that a majority (63.89% and 55.56%) had low level of socio economic status.

7. The mean of the socio technical variables was found to be the maximum for physical compatibility (4.16) and desirability (3.19) in the case of users.

8. The maximum response on the efficiency of the ICT was on saving time and money in interacting in both users (46.11%) and non users (37.78%).

9. The communication behaviour of the users and nonusers were uniform in all the three panchayats. It was found to be higher in the case of users compared to non users.

10. The F Value was found to be highly significant in the case of communication behaviour among users and non users.

11. The results show that they needed information on agriculture such as market rates, bio pesticides, bio fertilizers. These areas ranked top in their information needs. This was followed by organic farming, plant protection and cropping practices. In the case of user farmers 'saving the required information for future use' ranked first. This was followed by 'how to use mouse and switch on/off the computers'.

12. The socio economic status had positive and high significance with socio technical perception and communication behaviour. Also attributes perception and communication behaviour had positive significance at 5 percent level. But all the other variables were found to be non significant with each other in the case of users. In the case of non users it was found that none of the selected variables in the case of nonusers when correlated using Pearson product moment correlation showed any association with each other.

13. The relationship of selected independent variables of the Agricultural officers with the dependent variable showed negative significance with age. So as and when the age increases the perception about the characteristics of ICT decreases. ICT possession and exposure to ICT showed significance at 5% level.

14. The relationship of the dependent variables of the AOs showed high significance for socio technical behaviour, communication behaviour, perception on increase in productivity and information need. Communication behaviour was found to be positively significant at 5 % level for all these variables except for age gender and skill

requirement. Skill requirement was positively significant with gender. But the relationship with exposure to ICT, socio technical behaviour, perception on productivity and information need was negative at 5% significance level.

15. Relationship of Independent variable of the trainee farmers with knowledge gain was found to be negative and significant for occupation at 5 percent level of significance. The respondents showed a negative significance at one percent level for risk orientation and market orientation.

16. Relationship of Independent variables of the trainee farmers with Skill acquisition showed negative significance with economic motivation at 5% level and market orientation at 1% level. But it was positive and highly significant @ 0.01 % for information need and @ 0.001 % for knowledge gain.

17. The results of the paired t test on the knowledge gain revealed that there was a constant change from one week after the training to three months after the training.

18. Paired t test on skill acquisition by the non-users gave a highly significant value for skill acquisition at one week after training and one month after training, one week after training and three months after training and one month after training and three months after training. This shows that the training had its effect in bringing about changes in skill acquisition by the farmers.

19. It was found that lack of skills in using the facility (65.19%) is the most felt constraint by the farmers. This was followed by the content in other language (64.07%). The third position was given for lack of awareness.

20. The Suggestions as given by the farmers were that, care should be taken that the contents are in local languages and that it is useful even to illiterate farmers, Scheduled video conferencing can be arranged by the concerned institutions to provide expert advices to the farmers, More number of trainings on skills can be conducted to widen the user-base, The centers should provide multiple services to farmers so that it can be

made more functional on participatory basis, Suitable mechanisms need to be developed for the creation of location specific knowledge capsules.

5.1 PRACTICAL AND SCIENTIFIC UTILITY

The recent scientific revolution based on the emergency of the new areas of science, in agro ecology, biotechnology and sustainable agricultural production to market led production have lead to the growing importance of knowledge in the present day agriculture and natural resource management. The fast changing scenario in agriculture calls for the revitalization of agricultural extension system. The explosive presence of ICT and expansion of internet supported activities have created a wide range of opportunities to our farmers. Knowledge has become the most important factor of production, and it plays a crucial role in our capacity to respond to the challenges of food security, poverty eradication and sustainable development. The information and communication support for the five decades has been conventional. The extension personal of the department of agriculture disseminated the technological messages of the farmers manually. This approach in reality has to reach a majority lot within a stipulated time. This gap remains a challenge for the extension system even today. The farmer's needs are much more diversified and the knowledge requirement is beyond the capacity of the grass root level extension functionaries. Today it is possible to find a solution to this situation by using the potential of Internet based technologies to meet the location specific information needs of the farming and extension functionaries.

The very effective and efficient information transfer system is required to communicate the message of new technologies to the farmers. Hence the information communication technology is strengthening the research system, extension system and farmers condition for effective functioning in their respective fields. Dissemination of right location specific agriculture information to the right people at right time in understandable form is the most critical input for sustainable development of agriculture. Various extensions approaches have been tried, but the desires results still have its own limitations.

REFERENCES

The information services to farmers should be improved through the creative use of information communications technology.

5.2 SUGGESTIONS OF FUTURE RESEARCH

1. This study was limited to Trivandrum district as this was the only district in Kerala which had information kiosks operating in the Krishibhavans during the study period. This study will become a forerunner for the forth coming researches in this area.

2. Evaluative studies on ICT in agriculture especially in marketing, may be taken up for further improving in the present system since that is the most visited portion of such type of services.

3. Impact studies on agricultural dissemination systems may be under taken up and new expert systems may be developed for the benefit of farmers. .

REFERENCES

REFERENCES

Aasher, R. 1995. Networked communications in extension. Information Technology, plant Pathology and Bio Diversity (ede P. Bridge, P. Jeffries, D.R. Morse and P. R. Scott) CAB International, London, pp 407-417.

Adams, John *et al., Research Methods for Graduate Business and Social Science Students.* Response books, Business Books, Sage Publications, New Delhi.: p 54

Adescop, O. M., A. C. Agumagu and E. L. Adebayo. 2007. Extensionists and researchers proficiency requirements in information and communication technologies in south eastern Nigeria. *J. Extn. System.* ISSN 0970-2989. (1): pp 55-69.

Akpabio, I. A. 2007. Agricultural extension officials and utilization of information and communication technologies in Niger de.Lta, Nigeria. *J. Extn. System.* ISSN 0970-2989. (1): pp 29-41.

Ambili, K. S. 2004. Design and development of User education programme based on information needs of users in the KAU Library and Information System. Univ. of Kerala, TVM:p45-73.

Anand, S and Parashar, V. 2006. Integrating local and global knowledge through ICT; implications for rural business and development. *IIMB Management Review*, March 18: 85-71.

Anandaraja, N. 2002. Developing farmer friendly interactive multimedia compact disc and testing its effectiveness in transfer of farm technology. Ph D thesis, TNAU, Combatore.54-112.

Andara, R. S. 1999. Information Technology a concept and an application in communication. *Journal of Agricultural Information*, 4 (11): 51-55.

Anonymous. 2004. KISSAN NEWS. *Newsletter* of KISSAN Kerala project November. p 1

Anonymous. 2006. TARA-Haat. http://topics developmentgateway.org.: p 1

Arabi,U. 2005. Empowerment of women in Information and Communication Technology (ICT) - enabled services opportunities and challenges. *The Asian Economic Review:* 47:45.

Arora,S. 2005. Precision agriculture and sustainable development. *Kurushetra.* 54(2):19.

Bajwa, S. B. 2006. ICT Policy in India in the era of liberalization: Its impact and Consequences. GBER 3 (2) :pp 49.

Balasubramanium, P. 1992. Indigenous knowledge use in dry lands. M. Sc., thesis, TNAU, Combatore.54-112.

Balit, S. Calvelo Rios, M and Masias, L. 1997. Communication for development for Latin America: A regional experience. *FAO,* Rome, Italy. :p 75

Bindu, P. 2002. Study on management information system in institutional swine farm, M. Sc., thesis, KAU, Mannuthy, Thrissur.:p 63

Brien, J. A. O. 1997. *Management Information System.* Galgotttia publishers Pvt Ltd., New Delhi, pp 6-32.

Brown, Andrew. 1992. An adaptable methodology for managing technology transfer. Wayne State University, USA. :p15

Budhar, M. O. Q. Bojer and B. J. M. Secher. 1992. A computer based Decision Support System for selection of varieties. *Proceedings of workshop on Decision Support System in crop protection, Munster, Sp-report* (15): 19-24.

Burns. R, B. 1990. *Introduction to Research in Education.* Melbourne: Longman Cheshire.:p54-78

Cantrill, H, and Free, L, A. 1962. Hopes and fears for self for self and country, the self anchoring striving scale in cross cultural research. *Am. Behavioural Scientists* 3-30.

Celik, H. 1999. The function of agricultural extension in transforming to an information society. CAB abstracts, 125:20-22.

Chandan, J. S. 1997. *Management concepts and strategies.* UBS Publishers, Delhi, p 453.

Chandrima, C. 2004. Knowledge empowerment of farmers in Alappuzha District through Information and Communication Technologies. Dept. of Journalism and Communication, M. G. University, Kottayam.:p52-99

Chattopadhyaya, A. 2006. Global E-Government readiness: India vis-à-vis the rest of the world economics. *Productivity News.* Jan-Feb 44: 28-37.

Cinthia , Fernandaz. 2002. Hands on Training in computer use- a feasibility study, M Sc thesis, TNAU, Coimbatore. :p45-89

Costopoulou and Lambrou. 2000. A framework for electronic trading of hive products, *Bee world* 81(4):171-181

Dervin, B. 1990. Audience as listener and learner, teacher and confidente: the sense making approach. *In Public Communication Campaign*, ed, Rice, R,E and Whitney,C., California, Sage, pp 67-85.

Devi, Nirmala, S. and Kaliammal, R, P. 2006. ICT usage among students. *New frontiers in Education* (XXXVI) 4. Oct –Dec. 2006. *Ind. J. Edn.* ISSN 0972-1231: p 386-389.

Dhanraj, A. Patil and Jayawant, B. Ambedkar. 2006. Information and Communication Technology (ICT) and Rural Development: Lessons from Rural India. Information and Communication Technology. IASS Quarterly, 25(2): 105-121.

Frempong , A, F. , Joseph Kwarteng, Robert Agunga, and Moses M. Zinnah. 2006. Challenges of infusing information and communication technologies in extension for agricultural and rural development in Ghana. *J. Extn. System.* ISSN 0970-2989. 22(1): pp 69-82.

Geetha, G. Nath. 2007. Socio technical system analysis of tribal and settler farmers in the Western Ghat regions of Wayanad district in Kerala, PhD thesis, College of Agriculture, KAU, Vellayani. p 92.

Ghosh, D. K. 2004. IT Intervention in Local Governance. *Kurushetra.* 52 :39-43.

Gosh,S. 2001. Information and Communication Technology in Rural Development, *Kurushetra* 52:27.

Goyal, D. P. 1998. Management Information systems: Concept and Applications, New Delhi, Deep and Deep. p 35

Gupta, R. C. 1986. *Management Information systems,* CBs Publishers, New Delhi, pp 17-58.

Hafkin, N. and Taggart, N. 2001. Gender: Information Technology and Developing Countries- An analytical study, USAID. *Available at www.usaid.gov/wid/pubs/hafnoph.pdf. and retrieved on Jan 23, 2006.p* 1

Hahnweonsik, Lee-Byoungyeon, Lee-Key up and Kim-Jeounrae. 1994. Development of Agriculture Technology Information Network System (ATINS). RDA Journal of Agricultural Sciences and Farm Management. 36(2): 677-680.

Hardikar, D. P. 1998. Perception of development programmes and benefits derived by women beneficiaries of Ratnagiri district of Madhya Pradesh. PhD thesis, University of Agricultural Sciences, Dharwad, p 222.

Hassan, S. Nazreen. 1997. Communication behaviour of opinion leaders. MSc. thesis, TNAU, Coimbatore. P 56-134.

Hedjazi, R. Rezae and N. Zamani. 2006. Agricultural research and information system. *J. Extn. System, Jun*:1-15

Hodge, B., Fleck, R. A. and Honess, C. B. 1984. *Management Information systems*. Prentice Hall Company, Virginia,pp-100.

Hussain, M. M. 1992. Group Management in rice production –An action research. PhD thesis, KAU. Thrissur, p 258.

Islam, S, N. Mohd. Samir, Farooqi and H. O. Agarwal. 2005. Expert systems a boon for farming community. Agricultural Extension Review, Jan- Feb, 2005, p 3-6.

Jacob, T. A. 1990. *Group action at all stages- Key to success*. Summer Institute on group Management Techniques for Agricultural development. KAU, Thrissur, p. 201

Jain,R and Dahiya.S. 2001. e-Agriculture, Potential of Internet for Indian Farmers. *Kurushetra* 49: 34.

Jamatia, Phanibhusan. 1999. Participation of tribal women in agriculture and allied activities in Tripura state, MSc. Thesis, TNAU, Coimbatore.p 46-132

Javed, Jabbar. 1999. *The observations in first plenary session* of Asia Information Poor to Information Rich: Strategies for 21st century, Chennai on July 1, 1999 by Mr. Javed Jabbar, founder Chairman, South Asia Media Association and former Minister / Senator of Pakistan available at *http://manage.gov.in/managelib/faculty/VPSharma.htm*p_2.

Jayasubramanian, B. 1996. Impact of distance education programme of TNAU through correspondence course: a diagnostic analysis. MSc thesis, TNAU, Coimbatore: p 87-154.

Jizba, L. W. Crawford and M. Gorman. 1994. Guidelines for the bibliographic description of interactive multimedia. Chicago: American library Association: p34.

Johnson, Sott, D. 1999. Expanding the content base of technology education. *Technology transfer as a topic of study*. University of Illinois, Illinois. :p35-42.

Jones, E. 1997. The history, development and future of agricultural extension in improving agricultural extension, Rome. P 23-29.

Kadian, S. K. and Gupta, Sandeep Kumar. 2006. Effectiveness of a video compact disc (VCD) on dairy calf management practices, IJES 1 (1): 57-62.

Kamath, Rajagopal. 2003. A study of Management information systems in the public sector enterprises in Kerala. Univ of Kerala, TVM.:p 39-67.

Karthikeyan, C. 1997. An experimental study to develop an effective training module for potential growers of export oriented cut flowers, Ph D thesis, TNAU, Coimbatore: p 57-169.

Kaur,R. and Kaur, M. 2005. Cyber cafes: A revolution in communication. *J. Interacademicia* 9:117-122.

Koovakkai, Dineshan and Menakath, Harifa. 2007. Edusat as a source of information for the academic pursuit of teachers. *University News.* 43 (10), March, p 13-16.

Kraema,K.L. and Dedrick, J. 1994. IT and Economic development: Is the digital divide an inevitability. *Public Administration and Development.* John Wiley and Sons Limited 20:169.

Kumar, B. 2005. Towards Citizen Center Governance with ICT, *Kurushetra.* 53: 14-15.

Kumar, K. and Kumar, A. 2004. Internet and Rural Development. *Kurushetra.* 53: 42-46.

Kumari, P. Baby. 1996. Communication Behaviour of Opinion Leaders. PhD Thesis, TNAU, Coimbatore: 34-56.

Lambert, T. J. R. 1992. Multi media based computer aided learning in post graduate medical education. The LMF (Luddite Mentality Factor) as a barrier to entry. In Promaco Conventions (ed.), Proceedings of the International interactive Multi media Symposium, 451-461. Perth, Western Australia, 27-31. January. *http.//cleo.murdoch.edu.au/gen/asset/confs/iims/a2/lambert-t.html.retrieved on Feb 24,2006.*

Leo, C. P. 1986. Labour productivity and agri-business. *Agribusiness.* 2 (3): 269-278.

Lopoyetum, S.K. and Velanganni. 2005. E- Governance and modernization of co-operative banking organizations in the new century. *Co-operative perspective.* April-June 20:19-30.

Madur, Christian, N. 1988. An economic decision model for technology transfer. *Journal of Int. Engg. Mgt*, p. 23-27.

Mansingh, J, Paul. 1993. Socio economic scale construction Phd. Thesis, TNAU, Coimbatore. : 38-89.

Mathew, R. 2005. *ICTD project News letter. Feb.* http://www. i4donline.net. p 2.

Michailidis, Anastasios. 2007. Adoption of internet in agriculture. *J. Extn. System.* ISSN 0970-2989. (1): pp 1-13.

Miller, Wade, W. 1989. Computer Technology Resources Using the Computer to Develop Non Technical Skills. The Agriculture Education magazine, 29 (1): 12-18.

Minimol, M. C. 2005. E- Governance ad rural self government – a study of Kerala State., University of Kerala, TVM.: p 47-117.

Misra, Kumar, Pradeep. 1999. Electronic Mass media; a future perspective in distance education, *University News*, 38 (38): 16-27.

Mohan, S. and N. Arumugam. 1994. CROPES: Arule based Expert System for crop selection in India. *Transactions-American Society of Agricultural Engineers*, 37(4):pp 1355-1363.

Muller. 2000. Emergent e-commerce in agriculture. *World Agriculture Economics and Rural Sociology Abstracts*, 43(6):442.

Munnyua,H. 2000. The role of information and communication technology in rural development and food security, CAB International, Africa region Centre. *Available at the website www.fao.org/sd/CDdirect/CDreoo.55.htm and retrieved on mar 12, 2007.p 55.*

Murali, N. S. 1993. Audio Text system for monitoring and control of pests in field crops. *Bulletin-OEPP*, 23(4): 583-588.

Murugesan, P. 1996. Impact of training of mushroom cultivation – An analysis. MSc. Thesis, TNAU, Coimbatore: p 35-106.

Muthiah, M. 1981. Farm leadership for agricultural development- a critical analysis. PhD thesis, TNAU, Coimbatore.

Nair, Raman, R. 2004. An investigative and evaluative study of factors affecting quality of agricultural and farm information services in Kerala. PhD thesis, Univ of Kerala, TVM. p 37-129.

Nath, Balachandra, N. G. 2004. Extension strategies for the major farming systems in the context of the changing agricultural situation in Kerala. PhD thesis, College of Agriculture, KAU, Vellayani. p 120

Ommani, A,R. 2007. Appropriateness of E- Learning based IT to improve the productivity of crops. *J. Extn. System*: pp 70-80.

Oostrum, J. 1998. Sustainable agriculture needs of sustainable markets. *ILEIA Newsletter*. 14(4): 18-19.

Parvathi, S. 1995. A field experiment on farm women's cognitive domain relating to post harvest technologies . PhD thesis, TNAU, Coimbatore: p 230.

Philip, H. 1995. 2 D and 3 D visuals for effective video programme production- An experimental study. Ph D thesis. TNAU, Coimbatore: p 269.

Pitchadi, S. Sam.1987. Information sources of non contact paddy farmers and contact paddy farmers-their knowledge and adoption behaviour, M.Sc. thesis, TNAU, Madurai: p 66.

Pradeep, C. A. 2000. Utilization of communication sources by dairy entrepreneurs of Ollukara block in Thrissur District, M. Sc, thesis, KAU, Mannuthy, Thrissur. p 113.

Prasanth, K and Gupta,V. 2004. The e-Seva Project providing G2C services in Andhra Pradesh. *J. rural development*: 67-82.

Raghupathy and Talwar. 1990. Farm telecast and small farmers. Communicator, 25(3): p. 5.

Raghupathy. 1990. Influence of farm telecast on knowledge gain and symbolic adoption of mushroom cultivation by the farmers of Banglore (Urban) district. *Mysore Journal of Agricultural Sciences*, 25 (1): pp. 129-130.

Rani, S and Reddy, S, M. 2005. Agricultural information management behaviour of extension scientists. *The Andhra Agric. J.,* 52(1&2): 223-228.

Reddy, A and Reddy,K. 2005. The application of ICT in Indian Agriculture: The Case of e-saju model of web-based agricultural experiment advice dissemination system. http:// tot. cgpublisher.com/proposal/343/index-html: p 343.

Reddy,Krishna P and Ankaiah, R. 2005. A Framework IT based Agricultural Information Dissemination System to Improve Crop Productivity. *Current Science* 88 :1905.

Reeves, T. C. 1992. Research foundations for interactive multimedia. In Promaco Conventions (ed.), Proceedings of the International interactive Multi media

Symposium, 177-190. Perth, Western Australia, 27-31. January. http.//cleo.murdoch.edu.au/gen/asset/confs/iims/a2/reeves-t.html.: p 27-31.

Reynolds, W. George. 1992. *Information Systems for Mangers*. 2nd Ed. USA, West Publishing Company. p112.

Robert C. Walker and Lisa. A. Holden. 2000. Survey results from users of a Dairy Management Website. *Journal of Extension*, 38 (1).:146-149.

Robert, Evenson. 2001. *The economics of extension investing in rural extension.* Elsevier Applied Sciences Publications, Amsterdam: pp 65-91.

Rogers, E. M. and F. F. Shoemaker. 1971. Communication of innovations-a cross cultural approach. New York: the free Press.

Samad, Abdul. 2004. development of spatial crop suitability model through participatory and integrated land evaluation for sustainable agriculture. PhD thesis, College of Agriculture, KAU, Vellayani. p 112.

Sangeetha, K, Prathap .1999. An appraisal of existing management information system in district co-operative banks in Kerala. M Sc., thesis, KAU, Thrissur: p 98.

Sangha, G. S. and Kalra, R. K. 1993. Utilization of mass media sources by farmers. *Int. J. Extn. Edn.*, 29(1&2) : 32-26.

Sathyaseelan, R. 1998. An experimental study on sunflower extension methodology. PhD thesis, TNAU, Coimbatore. p: 130.

Seethamraju, Ravi. 2006. Web quality-a study of user perceptions. *IIMB Management review*. 18(1) March, p 4

Selvaraj, G. 1990. Effectiveness of video teaching on farmers' affective, cognitive and psychomotor behaviour. PhD thesis, TNAU, Coimbatore. p: 147.

Shastri, Moonam. 1996. An institutional assessment of the steel industry and its implications for a dynamic model of technology transfer. Fletcher school of Law and Diplomacy, Tufts University. :p 474.

Shaw, N. A. And Standfield, G. J. 1992. Compact Disc Intractive (CD-I): A multi media system of future. In Promaco Conventions (ed.), Proceedings of the International interactive Multi media Symposium, 409-414. Perth, Western Australia, 27-31.January. http.//cleo.murdoch.edu.au/gen/asset/confs/iims/92/Shaw-t.html:p 92.

Sheriff, F. R. et al. 2003. Information Technology and Rural Extension in India. *Final report of the IRDC project number CCOHS File No. 002.2.5:* p 2

Shibi, Sebastian. 2002. Effectiveness of computerized presentation vis-à-vis video presentation of sericulture technologies on the cognitive psychomotor and affective domains of sericulturists. M. Sc., thesis, TNAU, Coimbatore. p 238.

Singla, M. L. 1992. *MIS in Public sector*. Shipra 39-40.

Sivakumar, S. 2005. Indian farmers gain from Internet access. *Information technology* 32(4):24

Somasundaram , S. Muthiah, M. and Krishnakumar, K. N. 1990. Mass media utilization behaviour of farm women, *Tamilnadu J. Extn. Edn.*1 (3&4).:p 133

Somu, T. 1975. Identification of opinion leaders and studying their communication behaviour. M. Sc., thesis, TNAU, Coimbatore.

Suganya. 2000. Mass media utilization behaviour of extension personnel, M. Sc., thesis, TNAU, Coimbatore. :p 124.

Supe, S, V. 1969. Factors related to different degrees of rationality indecision making among farmers of Buldana district, PhD thesis, IARI, New Delhi. –p 83

Surendren. 2000. Participatory group approach for sustainable development of agriculture in Kerala . PhD thesis, College of Agriculture, KAU, Vellayani. p 89.

Taneja, R. P. 1989. Dictionary of Education, Anmol publications, Ansari Road, New Delhi. : p 68

UNESCO. 2001. Available at. *www.unesco.or.id/apgest/india-bp-it.pdt* and retrieved on January 2008.

Vedat, V and Eyler, M. A. 1990. Productivity management: Evaluation and improvement. *Productivity*. 31 (1): 69-75.

Vithal, M. P. 1988. *Information Systems and Effective Management Control*. Oxford and IBH Publishers, New Delhi, p 33.

Warren and Stone. 1999. Uptake of Internet services by farmers. *World Agriculture Economics and Rural Sociology abstract*, 43(6):466.

Wime, Padraig. 2007. Analysis of adoption and use of Information and communication technologies among Irish farm families. *J. Extn. System*. ISSN 0970-2989. (1): pp 14-28.

Zhang, Jumbio. 1999. on the establishment principle and operation mechanism the model in agricultural technology. *Extension Research of Agricultural mechanism*, 20(2): p 183.

APPENDICES

APPENDIX I

APPENDIX I

TERMS RELATED TO INFORMATION AND COMMUNICATION TECHNOLOGY IN AGRICULTURE

Accessibility- According to Hogde et al (1984) non redundancy represent non duplication of information. The same information is not stored or communicated using different reports. According to Kamath (2003) any in accurate information leads to faulty decisions, so accurate information is needed for successful decision making.

Adequacy- Also known as 'laser disk', analog storage medium, a large disk like a long-playing record. Not to be confused with 'digital video disk' – see digital versatile disk.

Archive - To store files which are not needed but cannot be discarded. This often involves backing up/saving to a separate hard disk, floppy disk or other storage medium. Also used for stored messages contributed to e-mail discussions, sometimes searchable by date, topic, contributor, etc.

Attachment - File which is attached (linked) to and sent with an e-mail message.

Availability - Availability is operationalised as ICT offered with reasonable proximity and appropriate hardware and software.

Awareness- Brien (1997) defines timeliness as the information provide when it is needed. According to Kamath (2003) it means the quality of information as far as time factor is concerned. For effective decision making timely information is essential.

Browser - Software used to search and retrieve information from the world wide web. Netscape, Microsoft Internet Explorer and ANT Fresco are browsers.

CD writer (compact disk writer) - Hardware device which can save information on to a CD.

CD-ROM -Compact disk read-only memory

Central processing unit (CPU) - Generally used to mean the microprocessor, the integrated circuit which is the controlling core of a personal computer, usually situated in the box with the hard disk. Sometimes used to refer to the box and its contents.

Compact disc interactive (CD-I) refers to multi media technology with a range of attributes, which have been designed to appeal to the home consumer market as well as industry and education. A combined multi media CD-I product must take into account the range of audio and image formation with the aim of ensuring the right balance between sound / image quality, disc capacity and the desired audio visual effect.(Shaw and Standfield, 1992).

Compatibility - Pieces of equipment and/or software which are capable of being used together without special modification or adaptation are termed 'compatible'.

Computer conferencing - Development of electronic mail designed to support many-to-many communication. Each conference consists of a group of users who have a common interest in the conference subject matter. Computer conferencing software enables organization, storage, structuring and retrieval of messages. In particular, messages may be organized under different topics, by author or by date of posting. See also list server, Usenet.

Computer-mediated communications (CMC) - Use of computers to communicate, as in computer conferencing and electronic mail.

Cost effectiveness- Chandan (1997) states that cost effectiveness of information is derived when its benefits out weigh when compared with its cost of gathering.

Cursor - Screen representation of a pointer which responds to mouse or keyboard movements.

Cyber Extension may be defined as dissemination of information over the cyber space for the well being of extension clients-the farmers, directly or through the established intermediary of extensionists. (Misra, 1999)

Cyberspace - Popular term for the internet, coined by William Gibson in his novel Necromancer, published in 1984.

Data are facts events, transations and so on which have been recorded. They are input raw materials from which information is produced. (Lucey, 1997)

Data is a collection of un-organized facts which lead to conclusions. (Kamath, 2003)

Database - Structured collection of conceptually related data or data files organized and stored in a computer system. Databases can be set up in different ways: for example, the simplest are tables with a row for each record (a set of related items such as an individual's name and address) and a column for each field (the categories within each record such as last name, house number, street, town, etc.). Hierarchical databases hold their data in tree structures, e.g. one for a school might divide into staff and students at a high level, with individual names at the lowest and divisions like department or class in between. The most powerful databases use a method of storing data which does not restrict the way users can query it.

Digital camera - Camera which captures and stores images as digital (electronic) information. Images can be stored either on a memory chip in the camera, on disks or in some cases on plug-in memory cards.

Download - To use one computer to obtain data from another computer, electronically. Downloaded information can be incorporated into other files, displayed, printed or saved.

E-Agriculture goes beyond technology, to promote the integration of technology with multimedia, knowledge and culture, with the aim of improving communication and learning processes between various actors in agriculture locally, regionally and worldwide. Facilitation, support of standards and norms, technical support,

capacity building, education, and extension are all key components to e-Agriculture. (FAO, 2005).

E-Agriculture is an emerging field in the intersection of agricultural informatics, agricultural development and entrepreneurship, referring to agricultural services, technology dissemination, and information delivered or enhanced through the Internet and related technologies. More specifically, it involves the conceptualization, design, development, evaluation and application of new (innovative) ways to use existing or emerging information and communication technologies (ICTs).(FAO Definition),(FAO, 2005).

Electronic commerce (ecommerce), simply defined as the general exchange of goods and services via the Internet, is already having a significant impact on agriculture. (U.S. Department of Agriculture, Economic Research Service, Agricultural Resource Management Study, 1999).

E-mail (electronic mail) - Messages or letters sent and received in electronic form via computers.

Expert System- An expert system also called a Knowledge Based System (KBS) is designed to stimulate the problem solving behaviour of an expert in a narrow domain or discipline. (Islam *et al.*, 2005)

Fax (facsimile) - Transmission of images over the telephone network, most often of letters or other text. Fax messages can be sent direct from a desktop computer fitted with a fax modem.

File - Collection of data held on a computer as one thing with one name. A file can be a piece of work created by the user in an application such as a word processor or a database. Each file needs a unique label (filename) in order to be accessed. See also

Floppy disk -Small portable data storage medium in which the disk is flexible (as opposed to a hard disk). Currently usually a 3.5 inch disk in a rigid plastic case. See also CD-ROM, hard drive.

Hard disk - Computer storage medium, rigid disk usually made from aluminium, coated with magnetic material and hermetically sealed, fitted internally in a personal computer. See also CD-ROM, floppy disk.

Hardware - Physical components of a computer or a communications system, including both mechanical and electronic parts, such as the processor, hard drive, keyboard, screen, cables, mouse and printer. Contrasted with software.

Information and communication Technology (ICT) - the organization for Economic Co – operation and Development (OECD) defines ICT as the set of activities that facilitates, by electronic means, the capturing, storage, processing, transmission and display of information. (Danraj and Jayawant, 2006)

Information is data that is shaped in order to be useful to the users. (Kamath, 2003)

Information need is an impediment preventing an individual from moving forward incognitive time and space. The person is faced with a gap that must be bridged by 'asking questions, creating ideas and/ or obtaining resources'. Such gaps do not occur in the abstract but arise out of particular critical events and situations. (Dervin, 1990)

Information need is an impediment preventing an individual from moving forward incognitive time and space. The person is faced with a gap that must be bridged by 'asking questions, creating ideas and/ or obtaining resources'. Such gaps donot occur in the abstact but arise out of particular critical events and situations. (Dervin , 1990)

Information need is what an individual ought to have for his work, his research, his edification, his research etc. (Lane, 1974)

Information need is what an individual ought to have for his work, his research, his edification, his research etc.

Information services means acquiring , organizing and managing relevant information, processing and repacking it if essential and delivering or making available the same the user community in agricultural sector as per their requirement at the right time. (Nair, Raman, R, 2004)

Information services means acquiring , organizing and managing relevant information, processing and repacking it if essential and delivering or making available the same the user community in agricultural sector as per their requirement at the right time. (Nair, Raman, R , 2004)

Information system is all components that work together to process data and produce information. All information systems have sub systems with their sub goals, all contributing to the organisation's main objective and goal.(Kamath, 2003)

Information system is all components that work together to process data and produce information. All information systems have sub systems with their sub goals, all contributing to the organisation's main objective and goal. (Kamath, 2003)

Informationization is the process through which communication technologies are used as a means of furthering socio-economic development. (Danraj and Jayawant, 2006)

Input device - Device which is capable of writing information to a computer system, such as a keyboard, mouse, touch screen, sensor, scanner or microphone.

Install - To copy all the files of a software package on to a computer and make any changes needed to existing files so that the software then works. Installation or set-up programs do this for users.

Interactive multi media is a media residing in one or more physical carriers (video discs, computer optical disc, computer audio discs etc.) or on computer networks. (Jizba et al., 1994)

Interactive multi media is defined as a merging of computer, music, voice text, animation and full motion video. (Reeves, 1992)

Interactive video (IV) - Computer linked by software to a video system which allows the user to control a video disk and explore the information on that disk; choices can be made about the order in which the exploration takes place.

Internet - Also known as the 'net', the inter-communicating computer networks which host and provide access to the World Wide Web, file transfer, e-mail, news and other services.

Internet service provider (ISP) - Organization with a direct connection to the internet acting as an intermediary for other users, providing them with an e-mail address and software, access to the World Wide Web, and often space on web servers for home pages etc.

Intranet - Internal web site set up to serve a closed group such as a school, which contains pertinent information such as school documents, bulletin boards, health and safety information etc.

Keyboard - Emulator device attached to the computer which enables switch users to use standard software. A grid of numbers, letters and symbols represents the standard keyboard. The user selects the characters required by scanning the device with the switches and the information is sent to the computer. See also assistive technology.

Keyword - Particularly associated with 'free-text' databases, an important word within text which is marked to ease retrieval. A search using a keyword will display each individual record containing it.

Kiosks are internet connectivity for small towns and villages that is just similar to the STD booths which revolutionalised communication by connecting villages outside world, through technological devices such as computer. (Danraj and Jayawant, 2006)

Local area network (LAN) - Communications system linking computers within a restricted geographical area such as a building or campus. This also allows computers to share information from a central source.

Menu - List of options from which a user can select in order, for instance, to start a program or open a file.

Modem (modulator-demodulator) - Device which translates digital signals into audio signals (and vice versa) so that data can be carried over ordinary telephone lines. Modems operate at different speeds depending on the model.

Monitor - Screen used with a computer, also known as a VDU (visual display unit) or DSE display screen equipment).

Motherboard - Main printed circuit board (PCB) in the computer, which holds the principal components. The processor and clock chips will either be plugged into or soldered to the motherboard. See also central processing unit.

Mouse - Small molded plastic box with clickable buttons on top and a rolling ball or optical 'reader' underneath, moved by hand across a flat surface to control the screen cursor position. It enables the user to access menus and to select and move words or other objects around the screen. Alternatives to the mouse include touch screens and trackballs.

Multimedia - Combination of moving images, graphics, text and sound. A multimedia machine is fitted with hardware such as sound and video cards and a CD-ROM drive, and may include peripherals such as a camera, microphone and scanner.

Network- Electronic communications system linking computers, computer systems and peripherals such as file servers and printers.

On-line database - Remote database which can be accessed over a network or via the internet.

On-line service - Service, often but not always an e-mail or database service, which is accessed remotely via telecommunications links.

Package - Software suite designed for a particular application or job, such as word processing or accounts.

Personal computer (PC) - Computer designed for individual users rather than several users at any one time.

Relevance - Brien (1997) relevance as any information related to the information needs of a specific recipient for specific situation.

Retrieval - 'Calling back' stored data into the computer's working memory. Also used for rescuing data which has been erased or corrupted.

Scanner - Device by which hard-copy pictures and text can be converted into digital form for use on a computer. Small hand-held devices work by rolling the scanner head across the paper. Larger flatbed scanners work rather like a portable photocopying machine. With a speech synthesizer, it is possible to scan text into the computer and hear it read aloud. Can also be used to read bar codes and convert them into numeric data.

Search engine – Software, often found on web sites, which searches for information on the World Wide Web or text-based databases.

Software - Generic term for all computer programs. Software falls into two major types: applications such as spreadsheets or databases, and systems software such as MS-DOS or Windows. In addition, there are utilities or tools. Contrasted with hardware.

Surf - Popular term for exploring the World Wide Web.

Switch - Input device which at any time can be either on or off. Where a user's physical movement is impaired, switches may be required to operate the computer. Many switches have been designed to meet the particular needs of disabled people. See also assistive technology.

Synergy is a concept of systems approach in which the components of a system work together in a way so that the integrated action of separate components has a greater effect than the sum of the individual components operating independently. (Kamath, 2003)

Synergy is a concept of systems approach in which the components of a system work together in a way so that the integrated action of separate components has a greater effect than the sum of the individual components operating independently. (Kamath, 2003)

Tele-conferencing - Using telephone and computer links to connect people in a meeting who are in different locations. Also known as audio-conferencing or video-conferencing if live (real-time) pictures are involved.

Telematics - Combining information and communications technologies and services.

Teletext - Ordered and structured system for displaying a limited number of information screens on a video or television monitor adapted to interpret such information which is sent with transmitted programmes as a narrow set of data at the top of the picture. The two best-known systems are those used by the BBC and commercial companies (Teletext, previously Oracle). These systems allow the user to make limited choices about the order in which they view the screens.

USB - Universal serial bus connector. Standard for connecting peripherals such as scanners and printer to personal computers simply and quickly.

User group - People who get together to discuss a particular product or technology. Each of the main computer manufacturers has one or more associated user groups.

Virus - Mischievous or destructive software transferred covertly to files and applications, often via the internet or with other files on a disk. Some can disable a computer or network once activated and must, if possible, be removed using anti-virus software. There are, however, many hoax virus warnings and users should not pass on such warnings unless they are sure of their reliability.

Web page - File created in hypertext mark-up language and displayed on the World Wide Web.

Web site - Area on a server linked to the internet which is devoted to one organization or individual's web pages.

Wide area network - In contrast to a local area network, this links computers at the same site, a network which links computers over a large geographical area, including telecommunication links such as satellites.

Windows - Originally the graphical user interface (GUI) between applications and the operating system developed by Microsoft for IBM-compatible personal computers, and from Windows 95 on, the operating system and interface combined.

Word-processor - Software originally devoted to the creation, editing, formatting, storage, revision and printing of text, but currently often including the capacity to include graphs, spreadsheets, and photographs, and to produce sophisticated page-layouts.

World Wide Web (WWW) - Also known as the WWW, W3 or simply the web, a distributed information service on the internet of linked hypertext documents accessed using a web browser such as Microsoft Internet Explorer or Netscape. On the web, any document can be linked to any other document.

APPENDIX II

KERALA AGRICULTURAL UNIVERSITY
DEPARTMENT OF AGRICULTURAL EXTENSION
COLLEGE OF AGRICULTURE, VELLAYANI

Effective Agricultural Information Delivery System: An Action Research among farmers

Interview schedule

Part I

(For farmers)

I. Personal variables

1. Name
2. Address
3. Age
4. Gender
5. Education
6. Annual income (Rs)
7. Occupation
8. Farming experience
9. Area under crops (Please indicate the area and the yield)

Crops	Area	yield this year	yield last year

10. Possession of modern ICT facilities (Please tick the appropriate items)

Computer	
Internet connection	
Telephone	
Mobile phone	
TV	
Radio	
Cable connection	
Newspaper	
Farm magazines	
Others specify	

11. Exposure to ICT facilities (Please tick the appropriate item and indicate their frequency of use) Frequency of use

ICT	At least once a week but not every day	At least once a month but not every week	Once in six months	Once in a year	Never
Computer					
Internet					
Telephone					
Mobile phone					
TV					
Radio					
Others					

II. Social behaviour

12. Social participation

Organization member office bearer chairman

13. Extension agency contact

Please indicate your degree of contact with the following extension workers

Extension agent	At least once a week but not every day	At least once a month but not every week	Once in six months	Once in a year	Never
Agricultural assistant					
Agricultural Officer					
Addl.Dir. of Agr.					
Dir. Of Agr.Bank officers					
Specialists from university					
Others specify					

14. Cosmopoliteness

a. Have you ever visited the neighbouring villages/ towns/ cities Yes / No

b. If yes how often do you visit the villages

Very often/ sometimes/ occasionally/ rarely/ never

c. Purpose of visit

Personal/ non agricultural/ agricultural/ both

d. Duration of visit

> 3 hrs 3- 6 hrs 6- 9 hrs One day > one day

15. Communication pattern

i. To whom do you interact mostly?

ii. To whom do you ask your doubts?

iii. To whom do you share you areas of interest?

III. Psychological behaviour

1.Innovativeness

When do you prefer to adopt a new practice?

a. As soon as it is brought to my knowledge

b. After I have seen other farmers do it successfully in their farms

c. I prefer to wait and take my own decisions

2.Risk orientation

Please give your degree of agreement or disagreement

SA-Strongly Agree, A- Agree, UD- Undecided, DA- Dis Agee, SDA- Strongly Dis Agree

Particulars	SA	A	UD	DA	SDA
a. It is good for a farmer to take risk when he knows his choices of success are fairly high					
b. A farmer should grow large number of crops to avoid greater risks involved in growing crops					
c. A farmer should rather take more of chance in making a big profit than to be content with smaller but less risky project					
d. A farmer who is willing to take greater risk than the overall farmer usually does better financially					
e. It is better for a farmer not to try new farming methods unless most other farmers have used them with success					
f. Trying an entirely new method in farming by a farmer involves risk but it is worth					

3.Scientific orientation

Please give your degree of agreement or disagreement

SA-Strongly Agree, A- Agree, UD- Undecided, DA- Dis Agee, SDA- Strongly Dis Agree

Particulars	SA	A	UD	DA	SDA
a. New methods of farming give better results to a farmer than the old methods					
b. The way a farmers fore father formed is still the best way of farming					
c. Even a farmer with a lot of experience should use new methods of farming					
d. A good farmer experiments with new ideas in farming					
e. Traditional methods of farming have to be changed in order to raise the level of living					
f. Though it takes time for a farmer to learn new methods in farming it is worth the efforts					

4.Economic motivation

Please give your degree of agreement or disagreement

SA-Strongly Agree, A- Agree, UD- Undecided, DA- Dis Agee, SDA- Strongly Dis Agree

Particulars	SA	A	UD	DA	SDA
a. A farmer should try new farming idea which may earn him more money					
b. A farmer should grow cash crops to increase monetary products in comparison to growing of food crops for his consumption					
c. It is difficult for farmers children to make good start unless for provided them with economic assistance					
d. A farmer must earn his living but the most important thing in life cannot be defined in economic terms					

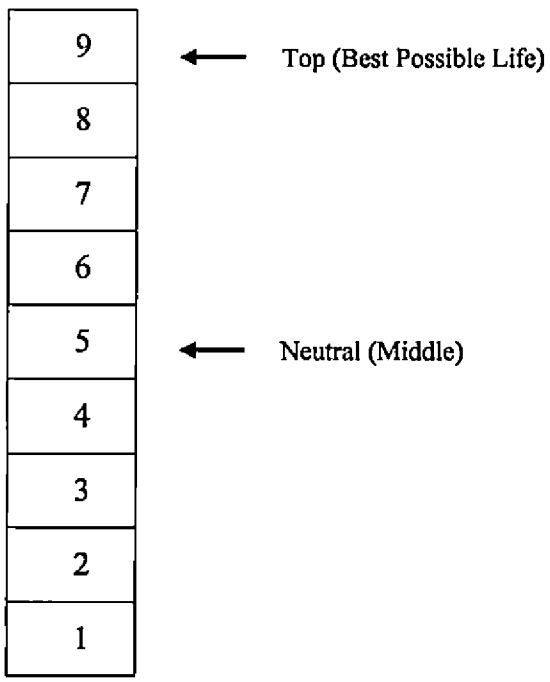
5.Market orientation

S. No	Particulars	Agree	Disagree
a	Market news is not useful to me		
b	By value addition one can get good price		
c	One should sell the produce to the nearest market irrespective of the price		
d	One should purchase inputs from where we get quality inputs		
e	One should go for crops which have more market demand		

6.*Level of aspiration*

Here is a picture of a ladder. The top of the ladder represents the best possible life for you, the bottom the worst possible life and the middle neutral. After reading the following question carefully, please select a number from the ladder.

1) Where on the ladder do you feel to stand personally at present ( )
2) Where on the ladder would you stay five years ago ( )
3) Where on the ladder do you think you would be five years from now ( )



IV. Socio technical variables

1.Physical compatibility

Is this ICT facility provided to you physically compatible for you to be benefit? Yes / No
If yes how far? Very much/ Much/ no opinion/ not much/ not compatible

2.Desirability

Do you desire to have this facility in this krishibhavan? Yes / No
If yes how far? Very much/ Much/ no opinion/ not much/ not desired

3.Flexibility

Is this facility flexible for you to use? Yes / No
If yes how far it is flexible? Very much/ Much/ no opinion/ not much/ not flexible

4.Social acceptability

Is this facility socially acceptable to our present condition? Yes / No

If yes how far it is socially acceptable? Very much/ Much/ no opinion/ not much/ not socially acceptable

5.Simplicity

Is this facility simple for you to use? Yes / No

If yes how far it is simple to use? Very simple/ Simple/ no opinion/ difficult / very difficult

6.User education

- Have you ever received any user education? Yes / No
- Do you think that the instruction of some kind will be useful to you? Yes / No
- Do you think that the user education help to recognize your own needs? Yes / No
- Do you think that the user education helps in making use of the information service effectively? Yes/ No

V. Attributes of ICT

Please evaluate the information received by you as per the given attributes of information communication systems

1.Availability

Always/ Sometimes/ Not sure/ Don't know/ Not available

2.Accessibility

i. Located at a distant place (from the residence of the user)
ii. Unable to pay the fee for accessing the ICT service
iii. Unable to access because of other pressing livelihood needs/jobs
iv. Working timings at the centre not suitable
v. Any other(s), please specify

Attributes	All information	Most information	Many information	Some information	No information
Credibility					
Timeliness					
Reliability					
Relevance					
Retrievability					
Adequacy					
Accuracy					
Explicitness					
Format clarity					
Non duplication					
Cost effectiveness					
Interactive ness					
Up to datedness					

VI. Communication behaviour(Please tick all that apply)

Information seeking

1.From where do you get the required information?

i.Information kiosks
ii. Kisan call center
iii. Extension agents
iv. Print media
v. TV / Radio
vi. Friends and relatives
vii. None

2. Who provides the content?

a) Locally created by KISSAN
c) Government departments
d) National Remote Sensing Agency
e) Meteorological department
f) Domain experts (from Health, Agriculture, Education etc.)
g) Community members
h) Collected from experts by infomediary
i) Any other(s), please specify

3. How do you manage the translation of content received in other languages to local language?

a) Translate the content on my own
b) Supported by extension agent
b) Engage a third party for content translation
c) Create and accept content only in local language
d) Any other(s), please specify

Information storing

1. How is content received?

1.On PCs itself
2.On floppies/ CDs
3.Through Email
4.Online using Internet
5.Printing the materials retrieved
6.Any other(s), please specify

2. Do you store the content in your local language?

a) All information
b) Most information

c) Many information
d) Some information
e) No information

Information dissemination

1. Is there an exchange of information within community and among communities?

a) Yes
b) No
c) Not yet, but plan to do so in future
d) Can't say

2. How do you disseminate the information you receive from the kiosks?, please specify the mechanism.

a) Through email /Online using Internet
b) Mobile/ telephone
c) Letters
c) By word of mouth
d) Don't share

VII. Efficiency as perceived by the users

a) How far do you feel that this facility is effective to you in your occupation? Please give your response by giving a TICK (√)

Sl. No.	Particulars	Tick
1	Gives personalized and timely information	
2	One stop shop information source	
3	Saves time and money in interacting	
4	Has all information the farmer wants	
5	Supports marketing	

b) My productivity has increased from previous years

Extremely Agree/ Quite Agree / Slightly Agree / Neither Agree or disagree / Slightly disagree/ Quite disagree / Extremely disagree

VIII. Constraints & suggestions

1.Constraints

Please indicate the constraints you face in receiving the required information (Please tick the appropriate items)

2. Suggestions

Please give you valuable suggestion in what ways we can improve our present information delivery system operating in our Krishi bhavans

3. What are the skills and information you retrieved with the aid of ICT ?

S. No	I. Skills you needed to retrieve information	Please tick
1	Switch on/off the computers	
4	Knowledge of the websites	
5	Exposure to the website	
6	How to use mouse	
7	How to use keyboard	
8	Using key words in retrieving information	
9	How to download files	
10	How to save the required information	
11	How to communicate using emails	
13	Knowledge of word processing	
14	How to use search engines	
15	How to read from web pages	
16	Other specify	
S. No	**II. Information you need**	
1	Crop production	
2	Plant protection	
3	Weather information and forecasts	
4	Market prices of commodities	
5	Organic farming	
6	Fertilizers	
7	Manures	
8	Marketing of produce	
9	Farm machineries	
10	New varieties and their availability	
11	Packing and processing	
12	Export of commodities and their standards	
13	Agricultural Magazines and bulletins	
14	Agriculture related News	
15	Development schemes	
16	Events	
17	Other specify	

KERALA AGRICULTURAL UNIVERSITY
DEPARTMENT OF AGRICULTURAL EXTENSION
COLLEGE OF AGRICULTURE, VELLAYANI

Part II

For Agricultural officers

Effective Agricultural Information Delivery System: An Action Research among farmers
Interview schedule

I. Personal variables

1.Name
2.Krishibhavan
3.Age
4.Gender
5.Education
6.Experience
7.Possession of modern ICT facilities (Please tick the appropriate items)

Computer
Internet connection
Telephone
Mobile phone
TV
Radio
Cable connection
Newspaper
Farm magazines
Others specify

8. Exposure to ICT facilities (Please tick the appropriate item and indicate their frequency of use)

ICT	
Computer	
Internet	
Telephone	
Mobile phone	
TV	
Radio	
Others	

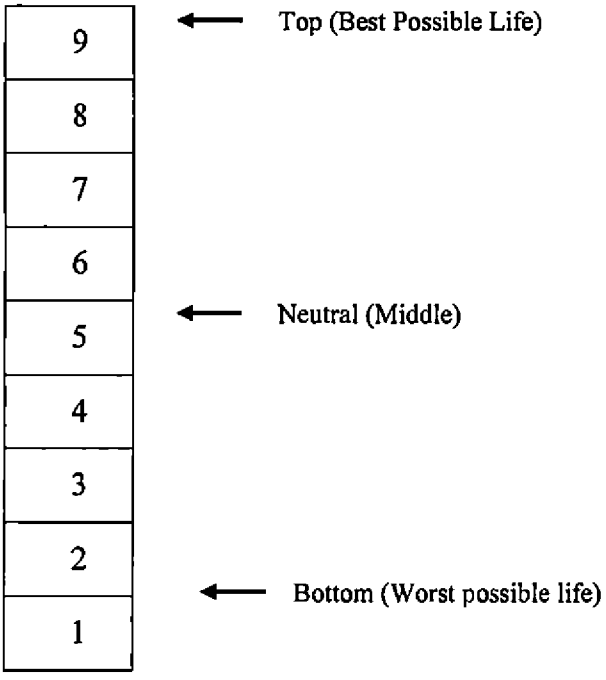
9.Extension agency contact
Please indicate your degree of contact with the following extension workers

Extension agent	At least once a week but not every day	At least once a month but not every week	Once in six months	Once in a year	Never
Agricultural assistant					
Agricultural Officer					
Addl.Dir. of Agr.					
Dir. Of Agr.Bank officers					
Specialists from university					
Others specify					

10. Level of aspiration

Here is a picture of a ladder. The top of the ladder represents the best possible life for you, the bottom the worst possible life and the middle neutral. After reading the following question carefully, please select a number from the ladder.

1) Where on the ladder do you feel to stand personally at present ( )
2) Where on the ladder would you stay five years ago ( )
3) Where on the ladder do you think you would be five years from now ( )



II. Socio technical variables

7.Physical compatibility
Is this ICT facility provided to you physically compatible for you to be benefit? Yes / No
If yes how far? Very much/ Much/ no opinion/ not much/ not compatible

8.Desirability
Do you desire to have this facility in this krishibhavan? Yes / No
If yes how far? Very much/ Much/ no opinion/ not much/ not desired

9.Flexibility
Is this facility flexible for you to use? Yes / No
If yes how far it is flexible? Very much/ Much/ no opinion/ not much/ not flexible

10. Social acceptability
Is this facility socially acceptable to our present condition? Yes / No
If yes how far it is socially acceptable? Very much/ Much/ no opinion/ not much/ not socially acceptable

11. Simplicity

Is this facility simple for you to use? Yes / No

If yes how far it is simple to use? Very simple/ Simple/ no opinion/ difficult / very difficult

12. User education

- Have you ever received any user education? Yes / No
- Do you think that the instruction of some kind will be useful to you? Yes / No
- Do you think that the user education help to recognise your own needs?Yes / No
- Do you think that the user education helps in making use of the information service effectively? Yes/ No

V. Attributes of ICT

Please evaluate the information received by you as per the given attributes of information comunication systems

1.Availability

Always/ Sometimes/ Not sure/ Don't know/ Not available

2.Accessibility

vi.Located at a distant place (from the residence of the user)
vii.Unable to pay the fee for accessing the ICT service
viii.Unable to access because of other pressing livelihood needs/jobs
ix.Working timings at the centre not suitable
x.Any other(s), please specify

Attributes	All information	Most information	Many information	Some information	No information
Credibility					
Timeliness					
Reliability					
Relevance					
Retrievability					
Adequacy					
Accuracy					
Explicitness					
Format clarity					
Non duplication					
Cost effectiveness					
Interactive ness					
Up to datedness					

VI. Communication behaviour

Information seeking

1. From where do you get the required information?

i.Information kiosks
ii.Kisan call center
iii. Extension agents
iv. Print media
v. TV / Radio
vi. Friends and relatives
vii. None

2. Who provides the content? (Tick all that apply)

a) Locally created by KISSAN
c) Government departments
d) National Remote Sensing Agency
e) Meteorological department
f) Domain experts (from Health, Agriculture, Education etc.)
g) Community members
h) Collected from experts by infomediary
i) Any other(s), please specify

3. How do you manage the translation of content received in other languages to local language?

a) Do you translate the content on your own?
b) Are you supported by extension agent?
b) Do you engage a third party for content translation?
c) Create and accept content only in local language
d) Any other(s), please specify

Information storing

1. How is content received?

1. On PCs itself
2.On floppies/ CDs
3.Through Email
4.Online using Internet
5.Printing the materials retrieved
6.Any other(s), please specify

2. Do you have the content in local language?

a) All information
b) Most information
c) Many information

d) Some information
e) No information

Information dissemination

1. Is there an exchange of information within community and among communities?
a) Yes
b) No
c) Not yet, but plan to do so in future
d) Can't say

2. How do you disseminate the information you receive from the kiosks ?, please specify the mechanism.
a) Through email
b) Online using Internet
c) By word of mouth
d) Discussions with villagers
Any other(s), please specify

VII. Efficiency as perceived by the users

a) How far do you feel that this facility is effective to you in your occupation? Please give your response by giving a TICK (√)

b)

Sl. No.	Particulars	Tick
1	Gives personalized and timely information	
2	One stop shop information source	
3	Saves time and money in interacting	
4	Has all information the farmer wants	
5	Supports marketing	

My productivity has increased from previous years
Extremely Agree/ Quite Agree / Slightly Agree / Neither Agree or disagree / Slightly disagree/ Quite disagree / Extremely disagree

VIII. Constraints & suggestions

11. Constraints

Please indicate the constraints you face in receiving the required information (Please tick the appropriate items)

12. Suggestions

Please give you valuable suggestion in what ways we can improve our present information delivery system operating in our krishi bhavans

The operational definitions of terms used in this questionnaire.

Variable	Operational definition
Accessibility	Refers to the ability to use the ICT
Availability	ICT offered with reasonable proximity and appropriate hardware and software
Awareness	To know what can be done with ICT and how to use it
Capacity building	Programs that seek to build the skill sets necessary to use , maintain, manage and integrate ICTs in the context of agriculture which include training to leverage access to communication networks, design ICT based marketing strategy and manage technology planning
Completeness	It is referred to as the extent of complete information that is retrieved by the user
Connectivity	Provide target groups with new or upgraded access to ICT equipment ad communication capabilities so that they may connect to information networks and process the information they need.
Credibility	Trustworthy ness of the information

Desirability	The degree to which the technology is worth
Exception reporting	It refers to information produced only when exceptional conditions occur or information produced periodically which contain details only about exceptional conditions
Explicitly	It refers to the content that does not need further clarification
Flexibility	The degree to which the technology is characterized by a ready capability to adopt to new alternative or changing requirement or conditions.
Interactiveness	It is operationalised as the extent to which the system provides for interacting will the experts, peer groups
Multiplier effect-	The extent to which the other organizations or communities become aware of the internet's usefulness as a communication tool as a result of the organization's internet connectivity which resulted in increased dialogue and/or aware-ness of internet-related issues and utilization of internet projects by nearby communities and organizations
Non duplication	It refers to non duplication of information communicated using different reported
Physical compatibility	The degree to which the technology is perceived as consistent with the infrastructural availability, past experience and needs of the respondent
Relevance	It is the information related to the information needs of a specific recipient for specific situation
Reliability	It is the information free from errors and biases at acceptable degree of confidence
Retrievability	It is operationalised as the extent to which the information provided in the system can be easily located and received by any user

Simplicity	The degree to which the technology is simple to be adopted by the farmers
Social acceptability	The degree to which a technology is considered useful, practical and feasible by majority of the members of a social system
Timeliness	It is referred to as the quality of information provided when it is needed.
Up-to datedness	This refers to the currency of information
User Education-	UNESCO (1977) defines user education as any effort or programme, which will guide and instruct existing and potential users, individually or collectively with objective of facilitating the recognition of their own information needs, the formalization oft their needs, the effective and efficient use of information services and the assessment of these services.

APPENDIX III

APPENDIX III

PANCHAYAT DETAILS

KUDAPPANAKUNNU PANCHAYAT DETAILS

Climatic Data

Max Temperature	-	32°c
Min. Temperature	-	26°c
Avg. Annual Rainfall	-	3000mm

Major crops	**Area**	**Other crops**	**Area**
Coconut	300 ha	Vegetables	11.8 ha
Banana	50 ha	Other tuber crops	5.0 ha
Tapioca	50 ha	Rice	2.0 ha
Others	20 ha	Arecanut	2 0 ha
Total	**420 ha**	Mango	3.0 ha

Vegetables

Ginger	2 .0	ha	Pepper	2.0 ha
Bitter gourd	2 .0	ha	Ginger	2.0 ha
Elephant Footyam	2.0	ha	Rubber	1.0 ha
Cowpea	2.5	ha	Betel vine	0.1 ha
Bhindi	1.0	ha	Total	22.1 ha
Snake gourd	1.0	ha		
Amaranthus	0.8	ha		
Cucumber	0.6	ha		
Chilly	0.4	ha		

CROPPING PATTERN

Sole Crops

1. Coconut
2. Arecanut
3. Pepper
4. Mango
5. Rubber
6. Tapioca
7. Betelvine
8. Vegetables

Intercrops

1. Banana
2. Ginger
3. Other Tuber Crops

Institutions and Infrastructure Facilities

A)	Krishi Bhavan	-	Kudappanakunnu
B)	Blcok Development Unit	-	2
C)	Gramasevika	-	1
D)	Ayalkootam	-	150

E) Fertilizer Input Supply -

a) Scb,Peroorkada

b) Kissan Jyothi, Step Jn, Nalanchira

F) Self Help Group	-	130
G) Anganvady	-	31

Agricultural Implements :-	No
Tractor	Nil
Power Tiller	Nil
Power Sprayer	1
Compression Sprayer	40
Thresher	1
Harvestor	Nil
Rocker Sprayer	30
Spade	5
Basket	5

Veterinary Support :-	
Veterinary Hospital	1
Subcentre (Icdp)	2
Veterinary Dispensory	1
Artificial Insemination Facility	3
Milk Collection Units	1
Milk Co-Operative Society	1

Major Sources Of Credit	
Indian Overseas Bank, Mukkola	1
State Bank Of India, Kudappanakkunnu	1
Catholic Syrian Bank,Ulloor	1
Peroorkada Service Co-Operative Bank	1

Agricultural Product Marketing:-

Local Market	1

Processing Unit

Oil Mill	1
Flour Mill	3

Consumer Service Institutions :-

Ration Shops	4
State Co-Operative Consumer Shops	1
Grocery Shops	10
Textile Shops	20
Hotel	30

Formal Education Institutions :-

Public School	3
Aided School	6
College	1
Primary Up School	2
High School	2
Libraries	5
Reading Room	4
Tutorials	14
Typewriting Institute	5
Computer Center	3

Health Facitlities

Hospital	2
Dispensary	3
Mother&Child Care Unit	1

Informal Institutions

Sports & Arts Club	10

Transportation

Road	80.53 Km
Tarred	34.4 Km
Untrarred	29.7 Km
NH	3 (Near To Panchayat)
Post Office	3
Electricity Coverage	75%

Public Drinking Water Supply:-

Public Taps	3333
Wells	3560
Public Wells	18 (5 Not In Use)
Tube Wells	6 (3 Not In Use)
Canal	2

Religious Institutions :-

Temples	6
Church	4

NEDUMANGAD PANCHAYAT DETAILS

Total paddy area

(Viruppu)	8 ha	(Mundakan)	8 ha
Coconut	910 ha	Areca nut	12 ha
Banana	215 ha	Tapioca	55 ha
Rubber	900 ha	Cashew	5 ha
Pepper	25 ha	Mango	20 ha
Cocoa	3 ha	Betel vine	2 ha
Ginger or turmeric	10 ha	Pulse	10 ha
Vegetables	30 ha	Others	567 ha

Details of paddy crop : Viruppu- Mundakan- Puncha

Area : 8 ha 8 ha 8 ha

No of farmers : 35

Major varieties : Jaya, Jyothi, Uma, Local Varieties

Area wise no. of farmers

25 cents : 3

25-30 cents : 20

0.5 – 1 acre : 10

1 acre- 1 ha : 2

Total : 35

Details of :-

Agricultural Implements	No
Pump set	326
Power Tiller	2
Tractor	Nil
Thresher	1
Winnower	Nil
Sprayers	120
Power Sprayer	36

Details of input agencies

Fertilizer

1) co- operative sector : 2 no. s
2) private sector : 5 no. s

Plant protection chemicals

1) Private sector : 2 no. s

Details of educational institutions

1. colleges : 2
2. HSS/ High school : 2
3. UP School : 7
4. LP School : 9

Voluntary agencies

1. Anganwadis : 46

2. Ayalkoottam : 256

3. Youth clubs : 2

Details of credit facilities

A. Co-operative societies/ Banks

1. District co –operative bank: 1

2. SCB : 1

3. Urban Development bank : 1

4. District Rubber Market Society: 1

5. Agrl. Service Co-operative Bank: 1

B. Nationalised Banks

1. SBT : 1

2. Canara Bank : 1

3. Bank of India : 1

4. Federal Bank : 1

No. of approved nurseries : 2

Total no. of SC Colonies : 14

Total no. of ST colonies : 1

Average yield and production

1. Paddy - Viruppu : 2200 kg/ ha

Mundakan : 2300 kg/ ha

2. Coconut : 3500 nut/ year/ha

3. Areca nut : 620MT / ha

4. Banana	:	12MT /ha
5. Rubber	:	3 MT/ ha
6. Cocoa	:	1500 kg/ha
7. Tapioca	:	10 MT / ha
8. Pepper	:	1.5 kg/ std

2. Padasekharams in the area

1. Karippooru	:	6 ha
2. Poovathu	:	1 ha
3. Other scattered area	:	1 ha
No. of padasekhara samithis formed	:	3
No. of padasekharams registered	:	3
No. of padasekharams now working	:	1

ULLOOR KRISHI BHAVAN DETAILS

Crops (in hector)

Paddy	: 3
Coconut	: 536
Areca nut	: 2
Banana	: 125
Tapioca	: 150
Pepper	: 10
Ginger	: 2
Mango/Jack/Sappota	: 25

Vegetables : 12

Others : 5

Climate

Average rainfall : 8 cm

Average maximum temperature : 32°C

Average miniximum temperature : 24°C

Groups

Kera samithis : 15

Haritha sangam : 2

Nationalised banks:

1. Syndicate Bank, Kesavadasapuram
2. State Bank of Travancore, Sreekariyam.
3. Catholic Syrian Bank, Ulloor
4. Indian Overseas Bank, Nalanchira.

Co-Operative Banks

1. Service co-operative Bank,Ulloor, Pongumudu
2. Service co-operative Bank,Ulloor Branch Mannanthala
3. District co-operative Bank, Prasanth Nagar
4. Harijan service co-operative Bank, Ulloor

Irrigation

Ponds : 56

Wells : 350

Pump sets : 292

Farm machineries

Thresher: 1

Sprayers: 30

Other facilities and services

Agro service centers: 1

Agro clinics: 10

Input dealers: 2

Green houses : 5

Horticorp depo : Ulloor 1

: Parottukonam 2

: Pongumoodu 1

Markets

Small : 1

Large : 2

APPENDIX IV

APPENDIX IV

TRAINING DETAILS

Training on hands on skills by farmers was conducted on 24th and 25th march. It was attended 30 farmers. The other participants include the Major Advisor Dr.N.Kishore Kumar and the officers in the department. The researcher presented the classes using well prepared PowerPoint. There were two sessions. In the morning session the farmers were given an orientation on computers its applications and how it is useful to them in their occupation. The afternoon session they were given practical classes on how to actually use the computers in retrieving the information. The plan of training is as follows

24.03.08, Monday

No. of participants 15

10 AM-11.30 AM	Orientation on computers
11.45 AM – 12. 45 PM	Class on practical application of computers
12.45 -1.30 PM	Lunch Break
1.30PM – 4.PM	Practical Session

25.03.08, Tuesday

No. of participants 15

10 AM-11.30 AM	Orientation on computers
11.45 AM – 12. 45 PM	Class on practical application of computers

12.45 -1.30 PM	Lunch Break
1.30 PM – 4.PM	Practical Session

The 30 participants attended the two sessions of the training classes. The training programme ended successfully on 25th March evening. The participants were convinced by the information given to them. The effects of the training were studied using an arbitrary questionnaire developed for the study at one week after the training, one month after the training and three months after the training. The results were documented and analyzed.

APPENDIX V

കമ്പ്യൂട്ടർ

- ആധുനിക ജീവിതത്തിൽ കമ്പ്യൂട്ടർ ഒഴിച്ചു കൂടാനാവാത്ത ഉപകരണം ആയിക്കഴിഞ്ഞു

കമ്പ്യൂട്ടറിന്റെ ഭാഗങ്ങൾ

- സി. പി. യു. ബോക്സ് (CPU Box)
- മോണിട്ടർ (Monitor)
- കീബോർഡ് (Keyboard)
- മൗസ് (Mouse)

സി. പി. യു. ബോക്സ് (CPU Box)

- പ്രോസസ്സർ (Processor)
  - ധാരാളം നിർദ്ദേശങ്ങൾ (instructions) അനുസരിച്ച് പ്രവർത്തിക്കുന്നു
  - നിർദ്ദേശങ്ങൾ കൂട്ടമായ് പ്രത്യേക (Program)
- മെമ്മറി (Memory)
  - പ്രൈമറി മെമ്മറി (Primary Memory) - ദിവസങ്ങളും (data) പ്രോഗ്രാമുകളും താൽക്കാലികമായി സൂക്ഷിക്കുന്നു
  - സെക്കന്ററി മെമ്മറി (secondary memory) - ദിവസങ്ങളും (data) പ്രോഗ്രാമുകളും സ്ഥിരമായി സൂക്ഷിക്കുന്നു
    - ഫ്ലോപ്പി ഡിസ്ക്, ഹാർഡ് ഡിസ്ക്
    - സിഡി റോം, സിഡിആർ റോം

ഇൻപുട്ട് ഡിവൈസുകൾ (input Device)

- കീബോർഡ്
- മൗസ്
- സ്കാനർ
- ഫ്ലാറ്റ്ബെഡ് സ്കാനർ

ഔട്ട്പുട്ട് ഡിവൈസുകൾ (Output Device)

- സ്ക്രീൻ
- പ്രിന്റർ
- പ്ലോട്ടർ

വിവിധതരം കമ്പ്യൂട്ടറുകൾ

- സൂപ്പർ കമ്പ്യൂട്ടർ
- ഡെസ്ക്ടോപ്പ് കമ്പ്യൂട്ടർ
- ലാപ്ടോപ്പ് കമ്പ്യൂട്ടർ

എം. എസ്. വേർഡ് (MS Word)

- ഡെസ്ക്ടോപ്പിൽ ഇടതുവശം താഴെയുള്ള start ബട്ടൺ ക്ലിക്ക് ചെയ്യുക
- മെനു (menu)വിൽ നിന്ന് MS WORD സെലക്ട് ചെയ്യുക.
- സ്ക്രീനിൽ തെളിയുന്ന വിൻഡോയിൽ ടൈപ്പ് ചെയ്യാം.

എം. എസ്. വേർഡ് (MS Word)

- ടൈപ്പ് ചെയ്ത കാര്യങ്ങൾ ഹാർഡ് ഡിസ്കിൽ Save ചെയ്ത് സൂക്ഷിക്കുന്നതിന്
  - FILE മെനുവിലെ SAVE ഓപ്ഷൻ സെലക്റ്റ് ചെയ്യുക
  - dialogue boxൽ save ചെയ്യേണ്ട file-ന്റെ പേര് ടൈപ്പ് ചെയ്യുക
  - താഴെയുള്ള SAVE ബട്ടൺ ക്ലിക്ക് ചെയ്യുക
- MSWord-ന്റെ ഉപയോഗം അവസാനിപ്പിക്കാൻ FILE മെനുവിലെ Exit ഓപ്ഷൻ സെലക്റ്റ് ചെയ്യുക

എം. എസ്. വേർഡ് (MS Word)

- Edit-Cut ടൈപ്പ് ചെയ്തതിന്റെ കുറച്ച് ഭാഗം മുറിച്ചെടുത്ത് വേറൊരു സ്ഥലത്ത് ചേർക്കാം.
- Edit-Copy ടൈപ്പ് ചെയ്തതിന്റെ കുറച്ച് ഭാഗം എടുത്ത് വേറൊരു സ്ഥലത്ത് ചേർക്കാം.
- Edit-Undo അവസാനം ചെയ്ത കാര്യത്തിന്റെ ഫലം ഇല്ലാതാക്കാം.

ഇന്റർനെറ്റ്

- വളരെയധികം അകലത്തിലുള്ള കമ്പ്യൂട്ടറുകൾ തമ്മിലുള്ള വാർത്താ വിനിമയത്തിനും വിവരശേഖരണത്തിനും വേണ്ടിയാണ് ഇന്റർനെറ്റിന് തുടക്കം കുറിച്ചത്.
- ഇന്ന്, വ്യക്തികൾക്ക് തമ്മിൽ വിവരങ്ങൾ കൈമാറാനും ബന്ധപ്പെടാനും ഉള്ള ഏറ്റവും ഫലപ്രദവും സൗകര്യപ്രദവുമായ മാധ്യമമായി ഇന്റർനെറ്റ് മാറിക്കഴിഞ്ഞു.
- കമ്പ്യൂട്ടറുകളുടെ ഒരു നെറ്റ്‌വർക്ക് എന്നതിലുപരി നെറ്റ്‌വർക്കുകളുടെ ഒരു നെറ്റ്‌വർക്കായിട്ടാണ് ഇന്റർനെറ്റ് ഇന്ന് അറിയപ്പെടുന്നത്.

ഇന്റർനെറ്റ് ലഭിക്കാൻ

- കമ്പ്യൂട്ടർ
- മോഡം
- സർവീസ് പ്രൊവൈഡർ
- ടെലിഫോൺ കണക്ഷൻ

ബ്രൗസർ

- ഇൻറർനെറ്റിലേക്കു പ്രവേശിക്കാൻ നമ്മു കമ്പ്യൂട്ടറിൽ ഉപയോഗിക്കുന്ന പ്രോഗ്രാമാണ് ബ്രൗസർ
  - ഇൻറർനെറ്റ് എക്സ്പ്ലോറർ
  - മൊസില്ല ഫയർഫോക്സ്
  - ഓപേറ

സേർച്ച് എഞ്ചിനുകൾ

- വിവിധ വിഷയങ്ങളിലെ വിജ്ഞാന ശേഖരങ്ങളെക്കുറിച്ചുള്ള വിവരങ്ങൾ സൂക്ഷിക്കുകയും അവ എളുപ്പത്തിൽ കണ്ടെത്താൻ സഹായിക്കുകയും ചെയ്യുന്നു
  - ഗൂഗിൾ (google)
  - യാഹൂ (yahoo!)
  - മൈക്രോസോഫ്റ്റ് ലൈവ് (MSN Live!)

വെബ് പോർട്ടലുകൾ

- ഏതെങ്കിലും ഒരു പ്രത്യേക വിഷയത്തിലുള്ള വിവരങ്ങൾ ലഭ്യമാക്കുന്നതിന് ഇൻറർനെറ്റിലുള്ള സംവിധാനങ്ങളാണ് വെബ് പോർട്ടലുകൾ.
  - കിസാൻ (www.kissankerala.org)
  - അക്വാ (www.aaqua.persistent.co.in/aaqua)

ഇൻറർനെറ്റിൽ നിന്ന് വിവരങ്ങൾ ലഭിക്കാൻ

- കമ്പ്യൂട്ടർ സ്ക്രീനിലെ Internet Explorer എന്നു താഴെ എഴുതിയിട്ടുള്ള 'കുക്കണോൽ' ഐസ് ഉപയോഗിച്ച് ക്ലിക് ചെയ്യുക.
- സ്ക്രീനിലെ വിൻഡോയിൽ, address എന്നെഴുതിയതിനു തൊട്ടുള്ള ചതുരത്തിൽ www.google.co.in എന്ന് ടൈപ് ചെയ്യുക.
- സ്ക്രീനിൽ Google എന്ന് എഴുതിയതിനു താഴെയുള്ള ചതുരത്തിൽ നമുക്ക് ആവശ്യമായ വിവരവുമായി ബന്ധപ്പെട്ട വാക്കുകൾ ടൈപ് ചെയ്യുക.
- സ്ക്രീനിൽ തെളിയുന്ന വിവരങ്ങളിൽ നമുക്കു ആവശ്യമുള്ളത് ഇല്ലെങ്കിൽ പുതിയ വാക്കുകൾ ഉപയോഗിച്ച് 'സേർച്ച്' ചെയ്യാം.

മലയാളത്തിൽ വിവരങ്ങൾ വേണമെങ്കിൽ

- Internet Explorerൽ, address--നടുത്തുള്ള ചതുരത്തിൽ http://www.kissankerala.org/kissan/mal/malayalamhome.jsp എന്ന് ടൈപ് ചെയ്യുക.

നന്ദി

APPENDIX VI

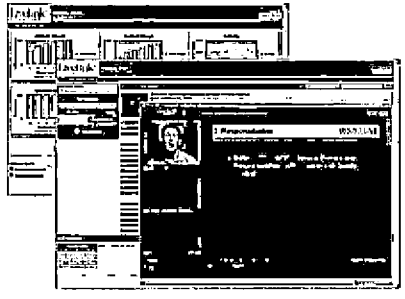
APPENDIX VI

ABBREVIATIONS

AgIDS	Agricultural Information Delivery System
AIMB	Agricultural Information Management Behaviour
ICT	Information and Communication Technology
IIITM –K	Indian Institute of Information Technology Management-Kerala
ISDA	Sustainable Agriculture Development
IT	Information Technology
ITC	Indian Tobacco Company
KISSAN	Karshaka Information System Services and Networking
MANAGE	National Institute of Extension Management
MIS	Management Information System
MSSRF	M. S. Swaminathan Research Foundation
NATP	National Agricultural Technology Project
PC	Personal Computer
SARI	Sustainable Access in Rural India
SES	Socio Economic Status
SMS	Subject Matter Specialist
VCD	Video Compact Disc

APPENDIX VII

വിരൽത്തുമ്പിൽ വിജ്ഞാനം പരിശീലന പരിപാടി



സംഘാടനം

വിജ്ഞാന വ്യാപന വിഭാഗം

കേരള കാർഷികസർവകലാശാല

വെള്ളായണി

വിവര സാങ്കേതിക വിദ്യ കർഷകരുടെ വിരൽത്തുമ്പിൽ

ആധുനിക ജീവിതത്തിൽ കമ്പ്യൂട്ടർ ഒഴിച്ചു കൂടാനാവാത്ത ഉപകരണം ആയിക്കഴിഞ്ഞു. നിത്യവും നമ്മൾ നേരിട്ടോ അല്ലാതെയോ കമ്പ്യൂട്ടറിന്റെ സേവനങ്ങൾ ഏതെങ്കിലും തരത്തിൽ ഉപയോഗപ്പെടുത്തുന്നുണ്ട്.

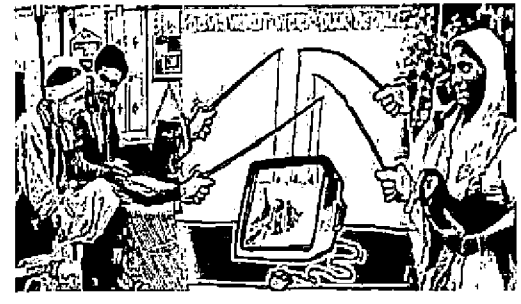
കമ്പ്യൂട്ടർ കൊണ്ടുള്ള നേട്ടങ്ങൾ

1. മനുഷ്യനു സാധിക്കുന്നതിനെക്കാൾ പതിന്മടങ്ങ് വേഗത്തിലും കൃത്യമായും കാര്യങ്ങൾ ചെയ്യുവാൻ കഴിയും.

2. വളരെയധികം വിവരങ്ങൾ കാലങ്ങളോളം സൂക്ഷിക്കാനും അങ്ങനെയുള്ള വിവരശേഖരത്തിൽ നിന്ന് ആവശ്യമുള്ളവ വളരെ വേഗത്തിൽ കണ്ടെത്തുവാനും സാധിക്കും.
3. ഒരേ സമയം ഒന്നിലധികം കാര്യങ്ങൾ ചെയ്യാൻ കമ്പ്യൂട്ടറിനു കഴിയും

ഇൻറർനെറ്റ്

വളരെയധികം അകലത്തിലുള്ള കമ്പ്യൂട്ടറുകൾ തമ്മിലുള്ള വാർത്താ വിനിമയത്തിനും വിവരകൈമാറ്റത്തിനും വേണ്ടിയാണ് ഇൻറർനെറ്റിന് തുടക്കം കുറിച്ചത്.



ഇന്ന്, വ്യക്തികൾക്ക് തമ്മിൽ വിവരങ്ങൾ കൈമാറാനും ബന്ധപ്പെടാനും – കേൾക്കുവാനും കാണുവാനും – ഉള്ള ഏറ്റവും ഫലപ്രദവും സൗകര്യപ്രദവുമായ മാധ്യമമായി ഇൻറർനെറ്റ് മാറിക്കഴിഞ്ഞു.

കമ്പ്യൂട്ടറുകളുടെ ഒരു നെറ്റ്വർക്ക് എന്നതിലുപരി നെറ്റ്വർക്കുകളുടെ ഒരു നെറ്റ്വർക്കായിട്ടാണ് ഇൻറർനെറ്റ് ഇന്ന് അറിയപ്പെടുന്നത്.

ബ്രൗസർ:

ഇൻറർനെറ്റിലേക്കു പ്രവേശിക്കാൻ ഒരു കമ്പ്യൂട്ടറിൽ ഉപയോഗിക്കുന്ന പ്രോഗ്രാമാണ് ബ്രൗസർ. ഇൻറർനെറ്റ് എക്സ്പ്ലോറർ, മൊസില്ല ഫയർഫോക്സ്, ഒപേറ എന്നിവ ഏറ്റവും കൂടുതൽ ഉപയോഗത്തിലുള്ള ബ്രൗസറുകളാണ്.

സെർച്ച് എഞ്ചിനുകൾ:

വിവിധ വിഷയങ്ങളിലെ വിജ്ഞാന ശേഖരങ്ങളെക്കുറിച്ചുള്ള വിവരങ്ങൾ സൂക്ഷിക്കുകയും അവ എളുപ്പത്തിൽ കണ്ടെത്താൻ സഹായിക്കുകയും ചെയ്യുന്ന സംവിധാനമാണ് സേർച്ച് എഞ്ചിൻ. ഗൂഗിൾ, യാഹൂ, മൈക്രോസോഫ്റ്റ് ലൈവ് എന്നിവയാണ് പ്രസിദ്ധമായ സേർച്ച് എഞ്ചിനുകൾ.

വെബ് പോർട്ടലുകൾ:

ഏതെങ്കിലും ഒരു പ്രത്യേക വിഷയത്തിലുള്ള വിവരങ്ങൾ ലഭ്യമാക്കുന്നതിന് ഇൻറർനെറ്റിലുള്ള സംവിധാനങ്ങളാണ് വെബ് പോർട്ടലുകൾ. കിസ്സാൻ (www.kissankerala.org) അക്വാ (www.aaqua.persistent.co.in/aaqua) എന്നിവ കൃഷി സംബന്ധമായ വിവരങ്ങൾ ലഭ്യമാക്കുന്ന വെബ് പോർട്ടലുകളാണ്.

കർഷകർക്ക് ആവശ്യമായ വിവരങ്ങൾ ഇൻറർനെറ്റിൽ നിന്ന് ലഭിക്കാൻ:

1. കമ്പ്യൂട്ടർ സ്ക്രീനിലെ Internet Explorer എന്നു താഴെ എഴുതിയിട്ടുള്ള 'ഐക്കണിൽ' മൗസ് ഉപയോഗിച്ച് ക്ലിക് ചെയ്യുക.
2. സ്ക്രീനിലെ വിൻഡോയിൽ, address എന്നെഴുതിയതിനു അടുത്തുള്ള ചതുരത്തിൽ www.google.co.in എന്ന് റ്റൈപ് ചെയ്യുക.
3. സ്ക്രീനിൽ Google എന്ന് എഴുതിയതിനു താഴെയുള്ള ചതുരത്തിൽ നമുക്ക് ആവശ്യമായ വിവരവുമായി ബന്ധപ്പെട്ട വാക്കുകൾ റ്റൈപ് ചെയ്യുക.
4. സ്ക്രീനിൽ തെളിയുന്ന വിവരങ്ങളിൽ നമുക്കു ആവശ്യമുള്ളത് ഇല്ലെങ്കിൽ പുതിയ വാക്കുകൾ ഉപയോഗിച്ച് സേർച്ച് ചെയ്യാം.

മലയാളത്തിൽ വിവരങ്ങൾ വേണമെങ്കിൽ Internet Explorerൽ, address-നടുത്തുള്ള ചതുരത്തിൽ http://www.kissankerala.org/kissan/mal/malayalamhome.jsp എന്ന് റ്റൈപ് ചെയ്യുക.

തയ്യാറാക്കിയത്:-

എസ്. നസ്രീൻ ഹസ്സൻ

ഡോ. എൻ. കിഷോർ കുമാർ

ഡോ. എസ്. മോത്തിലാൽ നെഹ്രു

ഡോ. ആർ. പ്രകാശ്

ഡോ. എസ്. ഹാജിലാൽ

ഡോ. വിജയരാഘവ കുമാർ

വിജ്ഞാന വ്യാപന വിഭാഗം

കേരള കാർഷികസർവകലാശാല

വെള്ളായണി

EFFECTIVE AGRICULTURAL INFORMATION DELIVERY SYSTEM –AN ACTION RESEARCH AMONG FARMERS

S. NAZREEN HASSAN

Abstract of the
Thesis submitted in partial fulfillment of the requirement
for the degree of

Doctor of Philosophy in Agriculture

Faculty of Agriculture
Kerala Agricultural University, Thrissur

2008

Department of Agricultural Extension
COLLEGE OF AGRICULTURE
VELLAYANI, THIRUVANANTHAPURAM-695522

ABSTRACT

Extension providers and client expectations include superior information accessing and dissemination, ongoing farmer-extension-research communications and marketing. AgIDS offer tremendous potential for accelerating development. They are transforming our lives, creating wealth and impacting every facet of human endeavor. Agricultural marketing requires connectivity between the market and exporters, growers, traders, industry consumers, through wide area network of national and international linkages in order to provide day-to-day information with regard to commodity arrivals and prevailing rates etc. this study was carried out with the objective of bringing out the underlying facts in the Information Communication technology available to the benefit of the farmers.

Thiruvananthapuram district has been purposively selected for the study because this is the only district in Kerala having information kiosks being operated in the Krishibhavans. From the ten Krishibhavans three Krishibhavans were selected based on the maximum numbers of users of this ICT facility based on the records available in the Krishibhavans. The respondents were selected by random sampling method. 60 user farmers and 30 non-user farmers from each panchayat were selected and they formed the respondents of this study. A total of 270 farmers were contacted for the study.

From a review of related literature and discussion with experts a comprehensive list of variables were selected. The dependent variables included attributes of ICT, Communication behaviour, information need and skill requirement. Majority of the farmers came under middle age group. Majority of the farmer in both the categories were found to be marginal farmers. Mostly the users were in a better socio economic group.

The Extension Service must be able to provide information that makes a difference. ICTs are tools that help build human network, increase public awareness and provide access to information and knowledge for the use of people. They include Telephone, Fax, GIS, Radio, Television, Print, Internet, Video, Audio, Computer and technologies on the drawing boards. Possession of ICT tools by users was found to be higher than the nonusers except for farm magazines where the nonusers out-numbered the users.

The mean of the socio technical variables was found to be the maximum for physical compatibility and desirability in the case of users. This was followed by social acceptability and simplicity. This was followed by physical compatibility and social acceptability. In both the cases user education had the minimum score. So this area needs more attention.

Majority of farmers in both the categories perceived efficiency of ICT as 'saving time and money in interacting' and has 'all information the farmer wants' in the nonuser category. This was followed by one stop shop information by the users and supports marketing in the case of non users. There existed significant relation ship between the dependent variables. Also significant relationship was observed in the relationship that existed between some independent variables and dependent variables. A majority of the users claim that they slightly agree to the fact that their productivity has increased compared to the previous year.

Analysis of variance showed a comparison between the user group and the non user group. It was found that the user group was higher in the case of all dependent variables. But in the case of information need it was found to be almost similar. A need assessment can help Extension educators to decide whether an extension program should be improved and how the services should be better delivered. The farmers needed information on agriculture such as market rates, bio pesticides, bio fertilizers. These areas ranked top in their information needs. This was followed by organic farming, plant protection and cropping practices. The skill requirement of the non-users farmers was more than the user farmers.

The action research was conducted in the form of training on the skills of using computers. The participants for the research were selected by random sampling from the list of non user farmers' interviewed. The farmers were exposed to the skills for five hours for two days i.e., for ten hours each to a group of thirty members. The influence of Training on the non-users observance on their knowledge gain, and skill acquisition at different intervals of time on the existing ICT facility was studied by documenting the knowledge gain, and skill acquisition at one week, one month and three months interval by the trainees. The results of paired't' test on knowledge gain and skill acquisition showed high significance between different intervals of time.

As perceived by the farmers it was found that lack in skill was the major problem that prevented most farmers in accessing through the ICT facility. The farmers also gave out some suggestions to bring this facility in a more effective manner. The study indicated anew strategy for solving the problems in technology dissemination by finding out the actual needs of the farmers in harnessing the benefits of ICT.