MARKETING AND CREDIT INFORMATION TO FARMERS: ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY

By

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DECLARATION

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I, hereby declare that the thesis entitled **"Marketing and credit information to farmers: Role of Information and Communication Technology"** 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 the award to me of any degree, diploma, fellowship or other similar title, of any other university or society.

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CERTIFICATES

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Certified that this thesis entitled "**Marketing and credit information to farmers: Role of Information and Communication Technology**" is a record of research work done independently by **Ms. Sruthy Madhavan** under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship or associateship to her.

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CONTENTS

CONTENTS

LIST OF TABLES

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES

LIST OF ABBREVIATIONS

LIST OF ABBREVIATIONS

aAQUA	: ***almost All Questions Answered***
AGMARKNET	: Agricultural Marketing Information System Network
AgRIS	: Agricultural Resources Information System
AGRISNET	: Agriculture Resources Information System Network
AIR	: All India Radio
AMIC	: Agricultural Market Intelligence Centre
APMC	: Agricultural Produce Market Committees
ATMA	: Agricultural Technology Management Agency
BSNL	: Bharat Sanchar Nigam Limited
CIC	: Community Information Centres
CSC	: Common Service Centres
DMI	: Directorate of Marketing and Inspection
DRI	: Differential Rate of Interest
FAO	: Food and Agriculture Organisation
FIB	: Farm Information Bureau
FVR	: Farmer Voice Radio
GBPUAT	: Govind Ballabh Pant University of Agriculture and Technology
GIS	: Geographic Information System
GPS	: Global Positioning System
GSK	: Grameen Suvidha Kendra
ICT	: Information and Communication Technology

ICRISAT : Institute for the Semi-Arid Tropics

IFFCO : The Indian Farmers Fertiliser Cooperative Limited

IIT : Indian Institute of Technology

IITK : Indian Institute of Technology Kanpur

IIITM : Indian Institute of Information Technology and Management

IKSL : IFFCO Kisan Sanchar Limited

INSAT : Indian National Satellite System

ITC : Indian Tobacco Company Limited,

IVR : Interactive Voice Response

KACE : Kenya Agricultural Commodity Exchange

KCC : Kisan Credit Card

KReSIT : Kanwal Rekhi School of Information Technology

KSITM : Kerala State IT Mission

KISSAN : Karshaka Information Systems Services and Networking

MCX : Multi Commodity Exchange of India Ltd

MTNL : Mahanagar Telephone Nigam Limited

NAARM : National Academy of Agricultural Research Management

NAIP : National Agricultural Innovation Project

NBFC : Non-Banking Financial Company

NeGP-A : National e-Governance Plan in Agriculture

NNRMS : National Natural Resources Management System

PACS : Primary Agricultural Credit Societies

PRCA : Participatory Rural Communication Appraisals

RADCON : Rural and Agricultural Development Communication Network

RKVY : Rashtriya Krishi Vikas Yojna

RML : Reuters Market Light

RRB : Regional Rural Banks

SDI : Skill Development Institutes

SDR : Sustainable Development of Rice

SIM : Subscriber Identity Module

SITE : Satellite Instructional Television Experiment

TCIL : Telecommunication Consultant of India Ltd

UNDP : United Nations Development Programme

VFPCK : Vegetable and Fruit Promotion Council Keralam

VRCs : Village Resource Centres

VSAT : Very Small Aperture Terminal

INTRODUCTION

CHAPTER 1

INTRODUCTION

Agriculture in India is as old as its civilisation. The search for food and control over food resources have led to assured agricultural and food production. Agriculture got evolved from time to time by different phases such as domestication, specialisation, green revolution etc. In all these phases, knowledge and technology are always transferred from generation to generation and from societies to societies. This process of transfer of knowledge and technology through different levels of media of communication is the key to development of farm and farmers. This makes knowledge transfer to the agriculture sector more crucial.

Technology makes miracles. Information technology has revolutionised the way people communicated to each other. Information and communication have influenced all spectrums of human life in the progress of the society. The pace of progress was, however, uneven among regions and sectors. Information and Communication Technology (ICT) could make only feeble presence in the agriculture sector, though ICT is of immense use in all stages of production, marketing and processing of agricultural commodities. The authorities all over the world have realised the use of ICT to address the challenges in agricultural production and to meet the specific information needs of farmers. Government of India has also recognised the potential of ICT in transforming Indian agriculture to modern, information driven and competitive sector, which has been highlighted in its agricultural policies. As such ICT has been occupying an important place in the strategy for development of Indian agriculture in the recent days.

1.1 Significance of the study

Agriculture today is in the process of transformation from traditional to modern. India is a developing economy where farming and related activities

constitute 13.9 per cent of GDP and provide employment to millions (GOI, 2013). Due to the increased significance of the sector in the economic development of the country and also the new opportunities brought out by the globalisation and liberalisation, the subsistence oriented farming system has changed to highly commercialised, market oriented farming system. Along with this transformation, the challenges and complexities in the sector have also got enhanced to a large extent. To overcome these challenges and complexities and to survive in the competitive environment, the sector need to be constantly updated with the latest ideas and better technology. It is possible only through the efficient dissemination of relevant information to the farming sector. It is said that "Ignorance is a disease and knowledge is its cure, which is achieved by obtaining information" (Momah, 1999). Information transfer to agriculture sector is essential along with necessary inputs to achieve sustainable agricultural development and technology driven second green revolution. With the advancement of Information Technology, information is considered as the fifth factor of production and information inputs can act as a driving force for agricultural development in the country.

With the changes in agriculture, in order to cope up with the current situation, farmers need authentic information about package of practices, cropping season, credit, market, technology, weather conditions etc. Among these information, marketing and credit information assume greater significance because all other information needs depend on them. Finance, as the life blood of any business, is needed by the farmers as well, easily and at low cost. Farmers need information about different sources of credit so that they can choose appropriate source based on their need and convenience. They are to be made aware of the changing agricultural policies of the Governments. They also need marketing information such as input supply, market trend, marketing practices etc. It will help them to make the farming operations more market oriented, profitable, and competitive.

The different sources of information to farmers include direct sources such as friends, relatives, fellow farmers, advisory system etc and indirect sources such as Information and Communication tools such as print media, electronic media etc. With the growth and development of agricultural communication and due to the weakness of the existing extension system there has been a shift from traditional method of information dissemination to technology - led communication or ICT. Initiatives like radio, television, telephone, internet etc. have been adopted by the agriculture and extension departments and different agencies for communicating information to the farmer community. The Government of India (GOI) also has given special emphasis to ICT and agricultural communication through various programmes and schemes and has come out with initiatives such as National Agriculture Technology Project (NATP), Community Information Centres (CIC), and Agricultural Marketing Information Network (AGMARKNET). Apart from government initiatives, corporates, Non-Governmental Organizations and private sector organisations undertake ICT programmes for farmers.

The growing importance of ICT in Indian agriculture is obvious from the Union Budget 2014-15. The Budget is aimed to uplift agriculture sector through information driven second green revolution. In his budget speech, the Finance Minister proposed to allocate Rs 100 crore for launching Kisan Television to provide real time information on various farming and agriculture issues. Also, Rs 100 crore is set aside for Community Radio Centres and have allotted Rs 500 crore for National Rural Internet and Technology Mission.

In this context of increasing policy decisions and allotment of funds by the GOI and State Governments, and initiatives by NGOs and private sector organisations for information dissemination regarding agriculture and related activities on real time basis, to the farmer community of the country, through ICT, the present study on "Marketing and credit information to farmers: Role of Information and Communication Technology" assumes great significance.

1.2 Statement of the problem

The next green revolution in India can be achieved only with the next generation of technology and infrastructural development. Indian agriculture is beset with some major issues and challenges that continue to hold back the growth in this sector. The government and policy makers have the challenge of ensuring a high growth in agriculture. The Five Year Plans and other policy actions have often set the target growth rate of agriculture at four per cent. But in the past few years the growth has been on an average of two per cent only. The share of agriculture in country's GDP has also declined to 13.9 per cent in 2013-14 which is more than half of that two decades ago (GOI, 2013).

Another major challenge that agriculture sector faces is how to increase the production in order to compensate with the growing population and decreasing natural resources. Food security is of prime importance to the Government. India's average operational land holding is less than two hectares where majority of the farmers are small and marginal. Measures to make their farm operations profitable and to raise their income level to cope up with the increasing inflation is an integral part of policy target of Government of India since many years. Presence of intermediaries reduces the profit of the farmers as they are ignorant about the real market price. Another challenge is lack of information about market demand and supply. Farmers also need information about the credit facilities available and the terms and conditions of credit.

To achieve all these targets, the Government in its policies, has given emphasis to information driven second green revolution and as a part of it number of ICT based programmes and schemes are launched. Though the policy makers have recognised the potential of ICT in agricultural information dissemination, and provided the information through ICT tools, the use of ICT tools by the farmers are limited due to various reasons. As per National Sample Survey Organisation (NSSO)

Report, 2003 at all-India level, 40 per cent of farmer households accessed various sources of information for modern technology for farming and of the sixteen different sources canvassed for accessing information for modern technology for farming, the most popular was 'other progressive farmers' with percentage of farmer households accessing information through the source as 16.7 per cent, followed by input dealer (13.1%) and radio (13.0%).

There exists an information gap of ICT tools and very few studies have been conducted to identify the reasons for this information gap. Some authors have pointed out that this gap is existing because of the non – availability of information or irrelevancy of information or farmers are facing difficulties in accessing ICT channels. Yet others have found that farmers are totally unaware about the availability of information and have no means to access it. In this context of different opinions with respect to the extent of use of ICT by farmers for meeting relevant information needs in agriculture, a study on the general information needs of marginal, small and large farmers with special reference to their marketing and credit information needs is undertaken. The awareness, access, and access gap in marketing and credit information of farmers are analysed after which the access, usage and usage gap of these information through various ICT tools have been identified. The level of credibility of the various ICT tools and the constraints faced by the farmers with respect to the use of these tools for obtaining information are also disclosed. In brief, the study is an attempt to unveil the marketing and credit information needs of farmers, their level of awareness about ICT tools to retrieve information, access to them and extent of use, so as to improve their agricultural operations.

1.3 Objectives of the study

The objectives of the study are:

i. To identify the information needs of farmers in Thrissur district with respect to marketing and credit.

ii. To study the extent of use of Information and Communication Technology by the farmers for getting these information; and

iii. To analyse the constraints in the use of ICT by the farmers.

1.4 Utility, scope and limitations of the study

The study has brought to light the most needed agricultural information to the farmers with special reference to marketing and credit information, which would help the Government and concerned agencies including banks and financial institutions to take remedial measures for providing the right information at the right time to the farmers through ICT tools. Although there are limited numbers of IT enabled information services in Kerala, the farmers are not even aware of them, as pointed out in the study. Action from the part of the authorities by way of awareness and training classes can make provision of relevant and adequate information support through ICT tools. The study has brought to light the problems or constraints in the adoption of ICT tools for obtaining information by the farmers for their farming operations so that planners can frame policies in this regard.

The major limitation of the study is that respondent farmers are new to many of the ICT tools like internet sources and mobile phones for agricultural information. Since farmers are unaware about ICT enabled initiatives in Kerala provided by Central and State Governments and other agencies, addressing extent of use of ICT tools seemed to be difficult. Farmers were preoccupied with their problems related to agricultural production and seeking solution for the same. It was difficult to separate the use of ICT tools for getting agricultural information from other purposes especially in the case of electronic media.

1.5 Organisation of the thesis

The report of the study has been presented in five chapters. The first chapter narrates the design of the study encompassing significance, statement of the problem,

objectives, utility, scope and limitations of the study and organisation of the thesis. The second chapter presents the review of available literature covering various aspects of the study. The third chapter elucidates the methodology and data sources adopted in conducting the study. The fourth chapter is set aside for the results and discussion of the study. The last chapter highlights the summary of findings and the conclusion of the study followed by references and abstract of the thesis.

REVIEW OF LITERATURE

CHAPTER 2

REVIEW OF LITERATURE

Literature review is an essential part of a research programme. All good research is guided by review of relevant literature. In research, literature is collection of published and unpublished information relevant to a particular research problem. Review is a careful examination of literature with an intention to get sufficient information in order to answer the research question. Chawla and Sondhi (2011) defines review of literature as "a comprehensive compilation of the information obtained from published and unpublished sources of data in the specific area of interest to researcher". This may include journals, newspapers, magazines, reports, government publications and also computerised databases. The main purpose of review of literature is to establish a theoretical framework for the study and also to assist in defining key terms, definitions, terminologies etc. It identifies studies, models and case studies supporting researcher's topic. It tests the research problem against what is already known about the research problem. Through review of literature, a researcher identifies the theory that the other research works say, the methodology used to carry out other research studies and the gap that the researcher intends to fill. With all these purposes in mind, in order to undertake a good research, review of literature relevant to the research problem is carried out and presented in this chapter under the following three sub headings:

2.1 Agricultural information needs of farmers

2.2 Sources and uses of Information and Communication Technology in agriculture

2.3 Constraints and challenges in adoption of ICT by farmers

2.1 Agricultural information needs of farmers

Agriculture is an information dependent sector since information input is vital for agricultural growth. Information is regarded as the fifth factor of production in agriculture and farmers need information on new technologies, market intelligence, various loan schemes etc. to increase farm production and to make agriculture more remunerative. There should be a need based information dissemination mechanism for delivering the necessary agricultural information to the end users. For this purpose it is essential to know the agricultural information needs of farmers. The abstracts of various studies and articles concerning agricultural information needs of farmers are discussed in this section.

Ozowa (1997) illustrated the information needs of small scale farmers in Africa and the problems in agricultural information dissemination. In the study, information needs are grouped under three categories, viz., for agricultural inputs, agricultural technology, and agricultural credit and marketing. It was observed that small scale farmers, because of their low level of literacy are mostly unaware of the existing loan facilities. They need information on the terms of loans such as interest rates, loanable amounts and mode of payment. Information regarding agricultural credit are obtained by them through channels such as relatives, friends, neighbours, government officials, and commercial and credit banks. According to the author, market information needs of small scale farmers are information on product planning, current prices, forecast of market trends, sales timing, improved marketing practices, group marketing etc. These are provided by the Ministry of Agriculture and the broadcasting media. Poor reception quality, insufficient information and unsuitable broadcasting time are the major constraints faced by the farmers in using broadcasting media. At the same time, the major constraint of print media is incomprehensible language used by it.

The information needs of women farmers in the Mubi region of Nigeria was evaluated by Elizebath (2007), through multi-stage random sampling process involving 300 respondents as sample for the study. Primary data were collected through questionnaire method and analysed using frequency counts, chi-square, and one-way analysis of variance. Findings of the study indicated that women farmers required information on credit availability, farm management, weather and soil management, besides awareness on improved seedlings, fertiliser and insecticides, animal health, future market prices, land tenure reforms and vaccination for animals. It was suggested that the extension delivery system directed at women farmers in the study region should primarily focus on providing information on weather, soil management, future market prices, credit availability, improved seedlings, fertiliser application, insecticides availability and agricultural insurance.

Hasan and Isaac (2008) described various dimensions of sugarcane farmers' information needs and possible application of ICT tools in realising those needs. According to the authors, farmers need information on input procurement and marketing of their produces. The need for marketing information arises when sugarcane is getting ready to be harvested and the questions such as where to sell, when to sell, how to sell and whom to sell have to be addressed at that time. Information provision related to sugar mills, jaggery units, transportation, crushing time, cane prices and agencies involved are also needed, which are explored by using database management systems, expert decision support systems, trend analysis and forecasting, and electronic networking and messaging systems. The authors found that modern ICT tools such as chatting, video conferencing and electronic mailing allow the widely separated farmers to maintain contact with each other and with experts irrespective of distance. The study concluded that all the ICT tools have the potential to empower the sugarcane farmers and thereby contribute to agricultural development.

Malik *et al.* (2008) made an attempt to analyse the information needs of farmers of Tarai region and the information sources used by the farmers to fulfill their information needs. Random sampling technique was adopted to select 81 farmers. Their socio economic characteristics, information needs and extent of use of information source were analysed. The study found out that majority of the farmers are young, belonging to general caste, educated upto high school, doing only farming and having land upto two hectares. Most of the farmers need information on agriculture, animal husbandry, and agricultural implements. Majority of them possess television (TV), radio, newspaper, magazine and telephones. Friends and neighbours are the frequently used information sources of the farmers.

A Participatory Rural Appraisal (PRA) exercise was conducted by Saravanan (2008) in Tamil Nadu to examine the information needs of tribal farmers and to understand their ICT availability and preferences. Village resource map and farm seasonal calendar were used as PRA tools and data gathered from the farmers' groups were analysed using ranking method and bar diagram. The farmers revealed their information needs on various crops, including marketing information. The study found that cent per cent of the farmers possessed radio and most of the farmers preferred computer with internet for getting agricultural information, followed by radio and television.

Meitei and Devi (2009) attempted to find out the information needs of the farmers' community in rural area and also highlighted the channels of information used by them to fulfill these needs. Data on farmers' information needs were collected using pre-tested semi structured questionnaire and data were processed and analysed through Minitab Statistical Software. The study revealed that rural farmers need a variety of information like information about credit facilities, sources of credit, terms and conditions, day to day market trend on prices of different variety of crops etc. But the required information for their day to day agricultural activities are not provided at present. Authors found that radio is the most popularly used information

source by the respondents followed by television, newspaper etc. The study concluded that application of ICT based agricultural information system is very much important for the dissemination of agricultural information and technical knowhow to the rural farming community.

The objectives of a case study by Okwu and Umoru (2009) were to identify the agricultural information needs of women farmers and its accessibility to them. Simple random sampling technique was used for sample selection and questionnaire was used to elicit information from the respondents. Both descriptive and inferential statistics such as chi-square analysis, frequency and percentage methods were used for data analysis. The study found that the highest information needs were in the areas of pesticides and fertiliser applications and improved farm implements. Husbands, fellow women and mass media were the main sources of agricultural information to women farmers and accessibility of information from these sources was relatively high. Age, educational level and income of women farmers showed significant relationships with their accessibility to agricultural information. It was recommended that enough information should be provided in the needed areas and women adult literacy and economic empowerment programmes should be given serious attention to enhance their access to needed agricultural information.

Raja *et al.* (2009) conducted a study with the objectives of accessing farm information input patterns and information needs of tribal farmers. Data were collected using pre-tested structured interview schedule and analysed by means of frequency distribution and percentage method. The study reported that majority of the tribal farmers were not having access to the advanced agricultural information and considerable proportion of farmers had, regular radio listening behaviour for getting farm related information. Most of the farmers require information on all farm based activities including farm credit and subsidies, market information, crop insurance etc. and it was found that radio need to be used as a prime communication method for farm information dissemination among the tribal farmers.

Yadav and Singh (2010) made an attempt to study the agricultural marketing information needs of farmers and the way in which these information are made available to the growers. It was found that large farmers had better access to the marketing information system and could afford computer, internet etc. Majority of the farmers listen to radio for getting market related information and acquisition of market related information using telephone was negligible. Those farmers who were well versed in political as well as economic affairs were interested in reading newspapers. The study ended with the findings that prevailing market prices of the commodities, comparative prices in the nearby markets, and extension activities by the state and central governments were the major information needs of the farmers. The study emphasised that getting right information from internet, upgradation of knowledge by making gainful use of various sponsored programmes on television, radio etc. were some of the current issues which need to be paid undivided attention so that the farmer can expect a reasonable share in the rupee paid by the consumer.

The objective of a study conducted by Achugbue and Anie (2011) was to identify the information needs of rural female farmers in the Delta region. The questionnaire was designed to collect data on ICTs and information needs of the female farmers above middle age. The study found that the rural female farmers were very keen to know more about crop production, because crop production is the major source of their income. Majority of the respondents relied mainly on their community leader, friends and relatives for acquisition of information whereas in some rural areas, internet services were also used. Few people, who were educated, indicated written materials, internet, radio and television as sources of information.

The main objectives of the study conducted by Oladeji *et al.* (2011) were to access the source of information and the type of agricultural information needs of root and tuber crop farmers who were selected by using simple random sampling technique. Structured interview schedule was used to collect data and were presented using percentages and rankings. The authors found that the most utilised sources of

information on agricultural practices were associations, other farmers, and extension agents. Agricultural information reported as "highly needed" by respondents included marketing procedures, processing and improved planting techniques, and soil management methods. Based on the findings, the authors suggested that extension agents should be encouraged to work more effectively, since they are important sources of information for root and tuber crop farmers.

Bachhav (2012) tried to find out the information needs of farmers in rural areas through survey methods among 175 farmers in rural areas of Nasik district of Maharashtra. It was revealed that majority of the farmers require daily information for various agricultural works. Most of the farmers need market information, followed by government schemes such as subsidies, import and export policy of agriculture production and bank credit facilities. Newspapers, fellow farmers and government offices were the major sources of information to farmers in general and a few farmers also sought information from others sources like television, magazines, agricultural exhibition etc. The study concluded that farmers must be able to get information delivered to them at a time and place of their choice which will be beneficial to them to realise productivity gains from the adoption of new farming practices, and to mitigate crop losses.

Ayoade (2013) observed the agricultural production needs of women farmers in Osun State, Nigeria. The author identified the socio economic characteristics of the respondents, activities carried out under agricultural production by the respondents, their sources of information, and accessibility to these sources. Using simple random sampling technique, a total of 104 respondents were selected for the study and primary data were obtained through interview schedule based on the objectives of the study. Frequency counts, percentages and mean values were used as descriptive statistics while Pearson Product Moment Correlation was used to determine the relationship between the socio economic characteristics of the respondents and agricultural production information needs of women farmers. The

results of the study revealed that the most highly accessible information sources of information to farmers are radios and Agricultural Development Programme (ADP) extension workers. The areas where agricultural production information are needed include book keeping, linkage with input supply and acquisition of land and credit. A significant relationship was found between household size, level of income, and agricultural information needs of women farmers.

The authors have examined the agricultural information needs of farmers and the channels or sources used by the farmers for getting needed information. The role of traditional information sources and the ICT tools were also discussed by some authors whereas a few authors blamed the prevailing extension methods in disseminating necessary information and suggested ICT tools as an alternative to it. Farmers need different types of agricultural information in order to carry out their farming practices. Most of the authors found out that marketing information was mostly needed by the farmers along with other information like farming practices and inputs such as credit, fertilizers, seeds etc. It is to be noted that many authors have highlighted radio as a prime communication method for farm information dissemination among farmers inspite of the present day advanced communication facilities.

2.2 Sources and uses of ICT in agriculture

Agriculture is vital to India and in the changing perspective, farmers need access to updated and exact information for improving the quality and quantity of agricultural operations. The knowledge about farmer's information sources could be valuable to identify the role played by different information sources in disseminating agricultural information among farmers. Besides indigenous sources of information, ICT, by accelerating the information delivery, has a key role in making agriculture more modern, competitive and remunerative. The review of various studies related to sources and uses of ICT in agriculture has been presented in this section.

Lively and Nuthall (1983) conducted a survey on farmer's attitude to information. The study was designed to access farmers existing source of information and to determine whether the existing sources are meeting the needs perceived by the farmers. One thousand farmers were selected using stratified random sampling and questionnaire was used for collecting data. It was observed that considerable amount of useful information is provided by existing sources particularly farm journals. Radio and television could provide some of this information and daily newspapers could provide constantly changing information, but it is difficult to get specialised data for each locality. So the authors suggested for the development of a new data system that can provide specialised data and are available twenty four hours a day.

Muhammad and Garforth (1999) attempted to identify farmers' information sources and their relative effectiveness to develop an appropriate strategy for effective dissemination of agricultural information among farmers. Sixty contact farmers and 128 non contact farmers were randomly selected from 16 villages selected at random through multistage sampling technique. Sugarcane was selected as a reference crop to access the information level of farmers. The data were collected through personal interview and were analysed using Minitab Statistical Package. It was found that large farmers depend more on one another for information than other sources. Observation appeared to be the major mode of information dissemination. Mass media proved to be more popular than direct contact and print media is regarded as the most effective source by the respondents. The study ended up with the finding that among the various information sources of respondents, the least effective is the Extension Field Staff (EFS).

Meera *et al.* (2004) examined the performance of three ICT projects in India such as government initiative Gyandoot in Madhya Pradesh, private initiative iKisan in Andhra Pradesh and government initiative Warana Wired Village Project in Maharashtra. The authors observed the organisation of each project, types of farmers involved, and their utilisation of the services. Both survey research design and

exploratory research design were used for collecting the data and Scott McConnell Model was used to analyse the data. It was found that in the State Government project, users most valued access to market information, land records and information on rural development programmes. In the cooperative project, question-and-answer services, accounting, and farm management information were valued most and in the private company experiment, participating farmers valued various types of information on practices, management of pests and diseases, and rural development programmes.

Irfan *et al.* (2006) attempted to determine the role of mass media in the dissemination of agricultural technologies among the farmers. A random sampling technique was used for selecting sample and the total sample size was 120 respondents. Data were collected through a pretested interview schedule. The results revealed that a simple majority of the respondents gave first preference to television, followed by radio and print media as source of agricultural information. A vast majority of the respondents are not listening to /watching agricultural programmes on radio /TV regularly or occasionally. With regard to effectiveness, TV, radio and print media are ranked first, second and third respectively.

The study by Jamwal and Padha (2009) was an attempt on the proper implementation and effective use of ICT in the field of agriculture and rural development for the benefit of the farming community and rural people of Jammu & Kashmir. The study was conducted by means of a questionnaire, with the objective of analysing a result-centric implementation of ICT for rural development and to know the constraints for the access to the ICT by the farmers and rural people. Stratified sampling had been done for in-depth analysis to find out the relation of ICT with agriculture and rural development. Measures of central tendencies and correlation were used to analyse the data. A socio-economic-scale named Uday Pareek Scale was used to do meaningful analysis of data. The study has come out with the conclusion that the funding of ICT by the government is significantly correlated with

improved uptake of ICT in agriculture. Absence of perceived economic benefits, cost of technologies, and lack of technology, infrastructure and training were the constraints identified in the study. The authors suggested that Agricultural Universities need to play an important role in familiarising farmers with the use of ICT, so that they become self dependant.

Kumar (2009) in his paper stated the origin, objectives, activities, challenges and future plans of e-Krishi project developed by Kerala State Information Technology Mission (KSITM). He has described e-Krishi as a market-driven agricultural initiative through IT enabled agriculture business centers in Kerala State. Akshaya centres act as agribusiness centres. It aims to address the existing gap in agriculture information flow and transaction management. E-Krishi has created a network of farmer community which has access to information on market demand, prices, good agricultural practices and quality agricultural inputs. The author opined that it involves challenge in getting the farmers and buyers to adopt it. E-Krishi has taken the initiatives to create a database of farmers in various districts of Kerala. It has provided several significant lessons regarding the use of ICTs in the agricultural sector. It has also demonstrated that ICTs have an important role to play in the agriculture sector.

In a study to assess the potential of ICTs as agricultural extension tools, Anastasios *et al.* (2010) identified, the extent of use of ICTs on farms, farmers' characteristics as related to ICTs' adoption and farmers' preferred extension delivery techniques. Data were collected through a large-scale survey addressing farmers in the West Macedonia region, Greece. Data were analyzed by employing both descriptive statistics and multivariate techniques. Two step cluster analysis was used to explore the different levels of ICTs' adoption and a categorical regression model was estimated to explain the variation. The study out that high - tech farmers use mobile phone, personal computers, internet and email very often whereas low - tech farmers use ICTs rarely and medium - tech famers manifest intermediate behavior.

Regardless of the level of communication sophistication, farmers desire a wide range of information delivery channels, particularly on farm demonstrations and farmer involvement in applied research. The authors specified that ICTs may supplement rather than replace traditional extension methods and, new roles for extension agents may emerge specifically addressing farmers' needs.

The main objectives of the study by Chauhan (2010) were to identify the expectations and opinion of the farmers towards internet facility and to ascertain the relationship between personal profile and opinion of the farmers towards internet facility. The study was confined to 100 farmers who were selected using simple random sampling. Data were collected using structured interview schedule and statistical tools such as frequency, percentage and co-efficient of correlation were employed to analyse the data. The study established that majority of the farmers know the importance of internet as an effective source to collect world wide information on agriculture and it was the fastest way to exchange information in the shortest time. It was highlighted that internet is a costly affair for the farmers but also the best means to collect information on market prices of agricultural products. Education, land holding, contact with Non Resident Indians, experience of internet use and mass media exposure were found to be significantly and positively correlated with the opinion of the farmers about the use of internet for farming community.

Dhaka and Chayal (2010) analysed the reaction of the farmers towards ICT as a source of reliable and timely information about best production practices, processing, marketing, input and output prices, financial and risk covering institutions etc. The focus of the study was on the attitude of the farmers towards ICT as a source of information. Stratified random sampling technique was used for the selection of the sample for the study. A pre-tested structured interview schedule was used to elicit information from the respondents and the data were analysed using appropriate statistical tools. It was found that majority of the farmers have favourable attitude towards the Information Technology and there is an increasing realisation about the

potentialities of ICT in agricultural technology dissemination. Insufficient regional specific information emerged as the main constraint for using ICT by the farmers. The study concluded that effective utilisation of ICT has potential to make the rural communities prosperous as it enables the dissemination of requisite information in user friendly form, easy to access, and cost-effective ways at the right time.

Islam and Gronlund (2010) made an interpretive case study as well as an evaluation research on the efficiency and effectiveness of mobile phone based Agricultural Market Information Service (AMIS) in terms of users, technology, process and facilitating conditions in a rural context. The evaluation study which was based on small scale surveys and observations aimed at analysing the effectiveness of the system in processing and disseminating information to the farmers and the effectiveness of the services from their perspective. It was observed that the effectiveness of a rural e-service depends on the design and delivery of the service in accordance with the individual's information needs, adaptive technologies with easy accessibility within a given infrastructure, affordable services with a rational business model, adequate awareness, and efficient communication with the respective community. According to the authors, awareness of the usefulness of the services and maintenance of efficient communication with the concerned community are important aspects for service acceptability and the weaknesses of the services are inadequate awareness and language difficulty in accessing the contents.

Singh and Mansotra (2010) examined the penetration of ICT for sustainable agricultural development with the objective of understanding the agriculture related ICT needs and problems of the farmers, with special focus on the small and marginal farmers J&K state in using ICT in various agro and socio-economic situations. Simple random sampling was used to select the respondents for the study and 2400 respondents including both farmers and government employees constituted the sample for the study. Data were collected through questionnaire and personal interview and were analysed using simple percentage method. The authors observed

that a few of urban area are aware of computers and internet, but none of them use internet, agricultural websites and government websites for getting information related to agriculture. Very few farmers of rural areas are aware of computer technology, internet, government websites, and agriculture websites. The citizens in general are not fully aware of the availability, advantages and applicability of ICT services in J&K. Lack of ICT infrastructure and shortage of trained manpower are the major limitations in using ICTs.

A study was carried out by Uplap and Lohar (2010) to identify the sources of information used by the farm women in the adoption of foodgrains storage. A sample of 170 women from ten villages of agricultural development block, Pune were selected randomly. Statistical tools such as percentage, mean, standard deviation and correlation coefficient were used for the analysis of data. It was found that majority of farm women were obtaining information from personal local sources such as relatives, neighbours and friends. The urbanised women obtained information from agricultural assistants and in case of mass contact, majority of the farm women used radio as source of information.

Aker (2011) reviewed the potential mechanisms through which ICT could facilitate agricultural adoption and the provision of extension services in developing countries, with particular focus on Market Information System. It also studied existing programmes using ICT for agriculture, categorised by the mechanism such as voice, text, internet and mobile money transfers, and the type of services provided. A field experiment involving SMS-based Market Information System was demonstrated in the study. The author stressed that mobile phones can improve access to and use of private information about agricultural technologies, thereby potentially improving farmers' learning. It can also improve farmers' management of input and output supply chain, facilitate delivery of other services and increase accountability of extension services. The study identified the potential constraints to such programmes in terms of design and implementation, and concluded with recommendations for

implementing field-based research on the impact of these programmes on farmers' knowledge, technological adoption and welfare.

Ali (2011) analysed the use of ICT enabled services for livestock information delivery based on a primary survey of 342 livestock farmers in eight districts of Uttar Pradesh. The differences in the quality of decisions on various livestock practices, between users and non-users of ICT driven information system have been assessed using analysis of variance (ANOVA) technique. Results indicated that ICT users are making significantly better quality decisions as compared to non-users. Correlation analysis between frequency of ICT use and socio-demographic profile of livestock farmers indicated a significantly positive relationship with operational landholdings, education, social category, income level and number of crops grown which provides practical insights for designing target based ICT driven information system for livestock sector development.

Aphunu and Atoma (2011) examined the extent of use of ICTs by the fish farmers in Isoko Agricultural Zone of Delta State in Nigeria. Data obtained from 60 respondents purposively selected for the study, were summarised using percentages, mean scores and correlation co-efficient. The respondents were within the mean age of 45 years and males were more involved than their female counterparts. They were mainly small scale fish farmers who were well aware of and used telephone, television and radio for their contacts and enquiries, report preparation, and information search. The use of ICT facilities were constrained by the problem of maintenance, low level of production and rural poverty. According to the authors, training to increase technical efficiency of farmers on ICT use and establishment and maintenance of appropriate policies to reduce rural poverty are instrumental in the use of ICT by fish farmers.

A study by Chang and Tuan (2011) aimed to explore the relationship of the market risk, ICT usage and information needs of green bean producers to further

promote the use of ICT – based information systems. The study was based on primary data on socio-demographic information, marketing characteristics, related factors of ICT usage, and personal ability in language proficiency which were obtained from 150 green bean producers through questionnaire and in-depth interview. Data analysis was carried out using SPSS software and statistical tests such as binomial test and Chi-Square Goodness of Fit Test. One-Sample Kolmgorov-Smirnov Test, Chi-Square Test of Independence and Fisher's Exact Test were used for examining the normality of a distribution and the independency of relationship between the variables. From the study, it was found that perishability, competition and price were the main marketing risks of green bean producers. Mobile phone and telecentre were the most commonly adopted ICT in the daily life and the key information needs included wholesale, retail, and input prices. Language and cost were the major limiting factors in further usage of ICT by the farmers. The study revealed that younger producers appeared to have relatively higher usage of TV and household telephone while older producers have higher usage of radio. Higher education was positively correlated to higher information needs on weather and agricultural policy. The authors suggested developing an information system supported by voice service as well as reliable and cost effective power sources.

A paper by Dahiya (2011) discussed the role of Information Technology (IT) in improving rural marketing in Iran. Poor access to market, inadequately structured farmers' association, high transaction costs that affect the viability of the supply chains and limited bargaining power were identified as the causes that lead to poor marketing of agricultural products in developing countries. Factor analysis was used to determine the impact and role of information technology in improving rural marketing. Factors were classified as communication-information, food processing, increasing production, managerial and marketing potentials. The study found that IT can improve the situation of rural marketing by providing information about suitable time, place and price of agricultural products, helping farmers how to sell their

products, facilitating access to credit, production sources and new markets, creating awareness of current policies in relation to market, and providing cheaper and faster commerce of agricultural products. Various ICT tools and techniques explored to acquire market were Word Wide Web, mobile phones and word space satellite radio. The study concluded that combination of these technologies affords a unique opportunity to overcome the challenges in collecting price information and report back to the communities in the remote areas.

The main objective of the study conducted by Dharurkar *et al.* (2011) was to analyse the reading habit of the farmers of Akola district of Maharashtra. Farmers were selected using simple random sampling. Reading habit was decided on the basis of the subject matter read, place of reading, quality of reading and time spent on reading, and distribution of reading habit was done in three levels such as overall reading habit, reading habit of newspaper and that of magazine. It was found that majority of the respondents are at medium level of reading habit of newspaper, magazines and overall literature. Most of them liked to read agricultural information from magazines. They read newspaper as whole publication and they liked to read it in their homes. Farmers used to spend only thirty minutes per day for reading and they used whatever farm information they received from the literature in their field.

A study on availability, use and information seeking behaviour of the farming community with reference to ICT by Kameshwari *et al.* (2011) examined the relevance of ICTs to the farming community and explored the ways of integrating ICTs with the existing public extension system. The study area was two hill districts of Uttarakhand and 132 farmers were selected as sample through multistage sampling technique. Closed ended questionnaire and interview schedule were used for collecting the data and simple percentage and graphical methods were used to analyse the data. The study found that farmers mostly relied on middlemen, local and official sources for agricultural information. It was found that use of ICTs is not constrained due to lack of formal education among the users, especially if there is adequate and

appropriate content in the local language. Television was the most popular medium in the rural area and among new ICTs, mobile phones were widely available but were mostly being used for post sale inquiry rather than price negotiation, accessing markets or price information or increasing production efficiency. The authors concluded that the possible advantages from use of ICTs in rural areas are offset by the absence of other input agencies and the entire supply chain can be made more effective by the use of ICT.

The main objective of the study done by Khatoon-Abadi (2011) was to determine and prioritise farmers' information channels and their communication networks within rural areas of central part of Iran. Two - step random sampling process was used to select 228 farmers who had regular contacts with the local extension offices, as sample for the study. Pre - tested structured questionnaire and interview schedule were used for collecting data and were analysed using SPSS software. The results showed that the extension system failed to build trust among the local communities and the printed materials did not play any significant role in the knowledge and information processes, among the farmers. The main sources of information are friends and relatives followed by TV and radio. The author observed that diversity, accessibility and reliability are the three main factors governing the adoption of information sources by farmers in rural areas.

Lashgarara *et al.* (2011) made an applied study aiming at identifying appropriate ICT tools for farmers and the role of ICT in improving agricultural products marketing. Research methodology adopted was descriptive and quantitative. The statistical population of the study included 109 agricultural experts and extension agents working in agricultural service centers and questionnaire was the main research tool for data collection. Statistical tools such as correlation co-efficient and multiple regression analysis were used for analysing the data. The dependent variable for the study was agricultural products marketing and the tools for ICT were the independent variable. The study found that ICT has a moderate role in improving

agricultural products marketing. Computers are the most important ICT tool for improving agricultural marketing. The authors highlighted that improvement in agricultural products marketing is partly related to the tools such as electronic journals, website and mobile. Computer education to the farmers in general, how to apply it in marketing, providing electronic journals for increasing their knowledge about marketing policies, establishing websites for introducing commodities, making available products price and more use of mobile for providing information about suitable time of harvest, and agro meteorological and pests outbreaks were suggested for improving agricultural marketing.

Okwu (2011) sought to characterise farmer users and non-users of mass media as sources of agricultural information in Benue state of Nigeria. The specific objectives of the study were to assess availability and use of mass media as sources of agricultural information, to examine the socio - economic characteristics of farmers in the study area and to identify the distinguishing socio - economic characteristics of users and non - users of mass media as sources of agricultural information. A structured interview schedule was used to obtain data from 316 randomly selected farmers and the data were subjected to discriminant analysis. The study found that radio is the most regularly used mass medium and television and newspapers are hardly accessible to and used by the farmers. Farmer users of mass media are those who have good level of education, belonging to a relatively high income bracket, and are typically male and of a relatively high socio - economic status. The author suggested that farmers' socio - economic characteristics should be considered in planning mass media usage in agricultural information dissemination and in order to solve the problem of low availability and accessibility or complete unavailability and inaccessibility of mass media as channels of agricultural information for rural farmers. The available mass media should devise ways of reaching out to the rural areas instead of concentrating their operations or attention on urban centers.

A study was carried out by Oladele (2011) with the objective of examining the perceptions of researchers, extension agents, and farmers regarding the impact of ICT acquisition on access to agricultural information in Nigeria. The study area consisted of eight selected states in Nigeria and a simple random sampling technique was used to select 88 researchers, 115 extension agents, and 271 farmers as sample for the study. Data collected through a structured questionnaire were analysed using means, standard deviation, and one-way analysis of variance. It was found that there was significant difference in the effect of ICT on agricultural information access among researchers, extension agents and farmers and access to agricultural information will continue to improve since perceptions are positive among the respondents. The study has clearly shown that ICT is gaining prominence and is improving access to agricultural information among researchers, extension agents, and farmers.

Papzan and Saki (2011) conducted a research on economic effect of electronic commerce on marketing agricultural produce of farmers. Descriptive and correlative research was chosen for the study. Statistical population included all of the literate residents of villages possessing ICT centres, in Kermanshah, in Iran. Sample size was determined as 333 persons by using Morgan Table and distributed by utilising proportional allocation distribution method among 21 villages possessing the necessary qualifications. Data were collected using pre tested questionnaire and were analysed using Spearman's Correlation Co-efficient. Majority of the literate farmers believed that ICT has affected economic profitability and outgrowth of marketing agricultural produce. The study made it clear that everyone can easily acquire the most recent information about prices, customers, and marketplaces through ICT tools. Cheapness, rapidity, ease, and transparency of information about selling and purchasing goods are the most important merits of trading using modern ICTs. The authors emphasised that by developing ICT, and providing possibilities and e-commerce equipment in villages, it is possible to execute informational bases on market demand and production prices, which will in turn improve the competitive

conditions of agricultural products in the marketplace, and also make trade more profitable for villagers.

Ting *et al.* (2011) in their study explained how IT could have an impact on agriculture in the next half-century as mechanisation had in the previous century. The authors have presented a systems-level perspective on the challenges and opportunities afforded by the integration of agriculture and IT. It was pointed out that the challenges associated with agriculture that must be overcome to achieve the desired increases in productivity are inherent heterogeneity, unanticipated disturbances, large geospatial dispersion, security and safety requirements, and constraints. The challenges provided significant opportunities for using IT in the field of agriculture in the form of approaches such as information gathering, information processing, and decision making. As IT is increasingly used to exploit opportunities and address challenges, agricultural output will increase, despite the challenging, inherent constraints. The authors recommended for a closer collaboration and integration among stakeholders to accelerate the introduction of IT into agricultural processes.

Chitra and Shankaraiah (2012) studied about ICT initiative in Indian agriculture. According to them, ICT has made access to information easy, updated, and cost effective. Introduction of ICT has enabled the dissemination of requisite information at the right time to the farmers. A one-time major investment in establishing communication technologies, insufficient power availability in rural areas, poor ICT infrastructure, ICT illiteracy, non availability of timely relevant content, non-integration of services, poor advisory services, lack of localisation, and in particular non availability of agricultural information kiosks/ knowledge centres at the grass root level are the barriers identified in the study for ICT implementation. The authors opined that the attitude and mindset of farmers need to be changed first

and there was a need to win their confidence and create awareness about the benefits of ICT in agriculture. According to them, ICT has immense potential to standardise and regulate agricultural processes and address the needs of farmers which will definitely serve as an important tool for agricultural development in the near future.

Meti *et al.* (2012) explained the performance and operational mechanism of Kisan Call Centre (KCC) in the country in her article performance of Kisan Call Center. A KCC consists of a complex telecommunication infrastructure, computer support and human resources organised to manage effectively and efficiently the queries raised by farmers related to agriculture and allied activities instantly in local language. It is a sophisticated voice operation centre that provides a full range of inbound or outbound call handling of service including customer support, direct assistance and other services. According to them KCC is significant in the Indian context, since the extension system is facing acute shortage of manpower and one extension worker has to take care of 1000 farmers which is an impossible task.

Samal (2012) enquired about the needs for ICT in agriculture and the role played by it in agricultural development. According to him, new approaches and technical innovations are required to cope up with the challenges faced by agriculture at present and to enhance the lifestyle of the rural population. ICT can facilitate areas such as market information, weather forecasting, input supplies and credit availability for the development of agriculture. The author suggested for a direct linkage between local producers, traders, retailers and suppliers by E-Commerce, as one of the ways for making IT useful for agricultural and rural development of the economy.

Ansari and Pandey (2013) attempted to access the potential and use of mobile phone by the farmers in Uttarakhand State. The sample of the study comprised of 180 farmers, selected randomly from the farmers visiting the Farmers' Fair at Pantnagar University. Findings indicated that majority of the farmers have been owning a mobile phone for more than two years, but most of them received information related

to agriculture from fellow farmers. The study illustrated the need for mobile based agri advisory services and possible policy implications for different stakeholders. The farmers identified areas such as disease identification and control measures, fertiliser application and its methods, harvesting time, marketing, and sowing time as the major types of services expected through mobile based advisory services.

Mohandas (2013) opined that ICT enable the farmers in obtaining information individually as well as collectively. Kisan Call Centre assists the farmers in clearing the queries related to their agricultural activities and make available necessary information at the right time. Agricultural programmes broadcasted in various audio visual media help the farmers in understanding the success story of other farmers, opinion of experts and the news on various schemes. He remarked that the aim of sustainable agriculture development can only be achieved through the effective use of ICT in agricultural sector and in the day to day activities of farmers. He pointed out the different use of ICT in the marketing of agricultural commodities. ICT can be used to know the highest price of an agricultural commodity in the market based on which the common market price can be fixed. It is also useful in determining a specific market for a produce by posting the details of the product in the web portal on agricultural marketing. The author concluded by suggesting that the benefits and opportunities of ICT must be considered while formulating and implementing schemes and plans for agriculture and allied activities.

Prabu (2013) reported the creation of a website called Agritech portal by the e-Extension centre of the Tamil Nadu Agricultural University which gives an exhaustive A to Z list of agricultural services. A training programme for farmers was conducted on basic theoretical information and hands-on training regarding the operations of computer and browsing the internet for gathering information related to their field. The farmers who underwent the training have used the portal for knowing about the prevailing weather conditions and to choose major markets based on produce price data available on the dynamic market information page of the portal.

The literature available on the sources and uses of ICT in agriculture reveal the extreme use of ICT in providing agricultural information to the farmers. Some authors have emphasised the use of print media by the farmers for getting agricultural information and others have identified friends, relatives and fellow farmers as sources of agricultural information. Many of the authors have agreed upon the increasing use of electronic media for obtaining agricultural information and suggest ICT tools as a supplement to extension delivery mechanism for farmers.

2.3 Constraints and challenges in adoption of ICT by farmers

ICT application in agriculture is an emerging field that focuses on the enhancement of agriculture in India. It encompasses the application of innovative ways to use ICT in the field of agriculture. Since it is an emerging field, there are challenges associated with its practical application. The foremost issue yet to be addressed is the problem faced by farmers in using ICT to access information on agriculture. The study would be incomplete without going through the available literature on constraints and challenges faced by the farmers in accessing and using ICT tools. Hence the abstracts of literature related to constraints, problems and challenges faced by the farmers in availing information related to agriculture through ICT tools are discussed in this section.

Abdulsalam *et al.* (2008) identified the available ICT tools and assessed the prospects and problems limiting the awareness and usage of ICT in Nigerian agriculture. Primary data were obtained from the respondents through the use of structured questionnaire. The information collected were analysed by the use of descriptive statistics and multiple regression technique. Results of the analysis showed that the educated respondents were more aware and made use of ICTs than those without formal education. The major problems identified with regard to the usage of ICTs by the respondents include poor access to ICT facilities, low sensitisation on available ICTs, poor source of power supply and high cost of

software and hardware. It was recommended that Government and NGOs should collaborate to improve sensitisation drive, not only to increase awareness but also to encourage application, improve power supply, provide accessible network at cheaper price, translate technology to local languages and provide training on ICT usage in the agro industry.

Mishra (2008) observed the extent of use of mass media by the farmers for different categories of agricultural information and elicited the factors affecting their utilisation of the same. The mass media selected for the study included newspaper, magazines, radio and television. Purposive random sampling was used for selecting 126 respondents as sample for the study. Data were collected through pre tested interview schedule and were analysed using frequency, percentage and mean. Out of the four mass media, radio was the most popular medium for agricultural information among farmers. Inability to read, inability to subscribe, lack of time, poor supply of electricity and adverse affect on children were the major factors responsible for limited utilisation of mass media by the farmers.

Munyua *et al.* (2008) pointed out the potential of emerging ICTs in efforts to tackle some of the challenges small-scale farmers face. The authors found that FM radio stations and cellular phones have become important tools in improving small scale agriculture in rural areas. Internet, web-sites and web-based applications are becoming increasingly important in sharing and disseminating agricultural information and knowledge, and marketing of goods and services. Other emerging ICT applications for small scale agriculture include Radio Frequency Identification (RFID), Market Information Systems (MIS), Geographic Information Systems (GIS), precision agriculture and public access facilities. The study also established that low usage levels of these technologies is the result of low technical capacity and limited ICT infrastructure in the sector, especially in the rural areas.

Patil *et al.* (2008) assessed the information needs of farmers, researchers and extension personnel and identified the main constraints in the adoption of ICT. Information was solicited by means of questionnaire from groups of agricultural scientists working in the University of Agricultural Sciences, Dharwad and extension personnel working in the Karnataka State Department of Agriculture. It was found that market information and weather updates are of prime interest. Illiteracy, cost and lack of awareness are the major adoption constraints. Human capital enhancement is understood to be the main remedial factor to change the low rate of ICT adoption and its effectiveness. To address the issues, a policy framework for the nascent Agricultural Information Technology sector was suggested by the authors.

Asingwire and Okello (2011) analysed the constraints in the use of ICTs by the smallholder rural farmers for market linkage, in Uganda. The paper was prepared from a case study of ICT-based projects, viz, Busoga Rural Open Source Development Initiative (BROSDI) and Women of Uganda Network (WOUGNET) of two local organisations. The constraints identified include poor ICT infrastructure, inadequate resources, high levels of poverty, low levels of literacy, inappropriate modes of information transfer and socio-cultural dynamics, and sustainability issues. The authors suggested that reaching the poor illiterate smallholder farmers requires redesigning the information content and delivery modes, so that the information comes in audio form, and in ICT tools that do not require literature.

Lashgarara *et al.* (2011) tried to identify the major challenges and implications of applying ICT in agricultural product marketing using a sample of 105 agricultural experts. Data were collected through survey method and the main tool of data collection was questionnaire. The dependent variable of the study was agricultural products marketing and independent variable was challenges and implication in using ICT in marketing. Descriptive statistics, measures of central tendency and variability indices were computed. For measuring the study hypotheses and relationship between independent and dependent variables, correlation

coefficients and step - wise multiple regression analysis were used. The authors found that ICT have a moderate role in improving the market conditions of agricultural products. Shortage of delivery services centres in rural areas for agricultural marketing, identifying and ensuring appropriate ICT, lack of sufficient support from private sector investing in agricultural marketing and inadequacy of effective regulations for developing ICT in agricultural marketing were identified as challenges of agricultural products marketing.

Ramaraju *et al.* (2011) made a comprehensive need assessment study to develop an understanding of agricultural related ICT needs, and problems faced in using ICT by the farmers in various agro and socio-economic situations with emphasis on small and marginal farmers. A primary survey was conducted using structured questionnaires, focus group discussions and Participatory Rural Appraisal. A total of 26 ICT initiatives in agriculture were studied, covering 12 states of India to elicit the need felt by farmers, prioritise their perceptions and bring out the issues involved in the development of ideal ICT applications for agriculture. ICT based delivery systems such as Community Radio, internet kiosk / web portal, mobile and call centres providing agricultural information were considered for the study. Various parameters such as socio-economic situation of the village, farming priorities, information needs, sources of information, ICT adoption level of farmers, technological orientation of farmers and analysis of impact were considered in order to understand the major dimensions of agricultural sector and issues sensitive to the farmers. The broad categories for analysis were Pan India data analysis, Modality - wise data analysis, Zone - wise data analysis and Individual initiatives data analysis. The authors found that young farmers were quite confident in ICT and its application. The study confirmed that the most popular information gadget possessed and accessed by the farmers is the mobile phone. The common problems in adopting ICT by farmers are ICT illiteracy, non availability of relevant and localised contents in their respective languages, unaffordable and difficulty in accessibility and

unawareness and unwillingness for adoption of new technologies. Farmers do not want to depend completely on technology; rather they wanted a combination of ICT and human intervention for gathering complete and authentic information. The authors suggested that there is a requirement for an integrated approach which should cater to the problems faced by farmers in using ICT applications, such as accessibility, acceptability, simplicity, timely and useful information related to both general and specific aspects covering pre-production, production, post-production and value addition in agriculture, animal husbandry and fisheries.

Ali (2012) analysed the influence of socio - demographic factors, business orientation of farmers, and farm characteristics on adoption of ICT based information through primary data collected from 461 farmers in eight districts of Uttar Pradesh, India. A personal interview survey was conducted using a pre-tested structured questionnaire. The Poisson Count Regression Model was used to analyse the factors influencing the use of the information derived through ICT-based systems on various agricultural practices. The findings of the study indicated that education, income, and social category of farmers are important socio - demographic factors affecting the adoption of ICT based information systems. Similarly, farmers who consider farming as a business venture, practise a diversified cropping system, and are more likely to use ICT-based information. The study recommended that ICT-based information delivery models must take into account the information needs and resource constraints of farmers. Priority must be given to the development of alternative methods for information delivery to those who are unable to use ICT-based information systems.

Franklyu and Tukur (2012) attempted to study the adoption success factors and adoption problems of ICT in agriculture. According to the authors, ICT can help the farmers in various areas of marketing such as functioning of spot exchanges, supply chain management, e-commerce, communication, health services etc. The reason for successful adoption of ICT in agriculture are increased need for

information, prevalence and simplicity, returns on investment, maintaining existing competencies, flexibility, on time information, and training and support. The major ICT adoption constraints are ICT cost and infrastructure, lack of awareness of the farmers, personal interest and preferences and personal impediments.

Ogbonna and Agwu (2013) examined the availability, importance and level of use of Information and Communication Technologies by the farmers in Enugu State of Nigeria. Structured interview schedule was used to collect data from 90 farmers randomly selected. Data were analysed using percentages, frequency counts, mean scores and standard deviation. Results indicated that radio, television, and mobile phone are the most available and used ICTs in the area. The importance of ICTs as perceived by the farmers are due to factors like, ICTs facilitating effective storage and retrieval of information in agriculture, easy access to information, cost and time reduction in agricultural production and marketing, among others. The constraints in the use of ICTs by the farmers include high cost of ICT infrastructure, low income, frequent power failure, lack of necessary skills and poor ICT training. The study concluded that farmers have limited agricultural information and recommended for providing necessary ICT facilities, training and infrastructure needed for effective communication in the rural area.

The constraints faced by the farmers in using ICT are mainly in terms of unaffordable costs of ICT infrastructure, illiteracy leading to non –accessibility, question of reliability of information and lack of regional orientation of information. The inadequacy of effective regulations for developing ICT in agricultural marketing has been identified as one of the major challenges in the adoption of ICT based information.

Although the review of literature have been arranged under three main sections it is not a watertight classification. There have been cases where the same author have discussed more than one of the topics, viz, need, sources, uses and

constraints of ICT in agriculture. To avoid repetition, such studies have been put under the classification where they suit best covering all the issues. The review as a whole underlines the significance of ICT in the dissemination of agriculture information to farmers bringing out clearly the inadequacies of the present system. Studies so far have been mainly been from places outside Kerala. Hence the information needs of the farmers in Kerala, particularly with respect to marketing and credit, their extent of adoption and constraints faced by them are enquired into in the ensuing chapters.

MATERIALS AND METHODS

CHAPTER 3

MATERIALS AND METHODS

The study entitled 'Marketing and Credit Information to Farmers: Role of Information and Communication Technology' has been conducted with the objectives of identifying the information needs of farmers in Thrissur district with respect to marketing and credit; studying the extent of use of Information and Communication Technology (ICT) by the farmers for getting these information and analysing the constraints in the use of ICT by the farmers. This chapter explicates the methodology and data sources employed in conducting the study, which are presented as follows.

3.1 Concepts used in the study

3.2 Locale of the study

3.3 Sources of data

3.4 Selection of the sample

3.5 Statistical tools used for the study

3.1 Concepts used in the study

The major concepts used in the study are given below:

3.1.1 Marginal farmers

Farmers whose land holdings are less than one hectare (ha) are considered as marginal farmers.

3.1.2 Small farmers

Farmers who possess a land holding in between one to two ha are considered as small farmers.

3.1.3 Large farmers

A large farmer is one whose landholding exceeds two ha.

3.1.4 Operational definition of Information and Communication Technology (ICT)

Information and Communication Technology encompasses sources of information such as newspaper, farm magazines, radio, television, telephone, computer and internet including agricultural portals as well as various related services and applications associated with them.

3.1.5 Awareness about information

Awareness about information on agriculture refers to whether farmers have knowledge about a particular agricultural information.

3.1.6 Access to information

Access to information denotes whether the information is available for use and the farmer has approachability to the information which will add to his existing level of information about a particular aspect.

3.1.7 Information access gap

Information access gap is the difference between awareness and access of agricultural information by the respondent farmers.

3.1.6 Information usage gap

Information usage gap is the difference between information accessed and actually used by the respondent farmers.

3.1.7 Geographic Information System

A Geographic Information System (GIS) is a computer system designed to capture, store, manipulate, analyse, manage, and present all types of geographical data.

3.2 Locale of the study

For examining the extent of use of ICT by the farmers in Thrissur district with respect to marketing and credit information, three Panchayats, were selected from the 92 Grama Panchayats of Thrissur district based on the highest area under cultivation for major crops. The selected panchayats are Varantharapilly (7265.84 ha), Pananchery (7251 ha) and Mattatur (4383.12 ha) (Kerala State Land Development Board, 2007).

3.3 Sources of data

The study has been fundamentally based on primary data. For the purpose of the three objectives, viz., identifying information needs of farmers with respect to marketing and credit, extent of use of ICT for getting marketing and credit information and the constraints in using ICT, primary data regarding socio economic indicators, cropping pattern, sources of credit, method of marketing, information needs of farmers, awareness, access and use of various ICT tools and constraints in using ICT tools have been collected from 30 farmers of each selected panchayat, using a pre-tested structured interview schedule. The information required for presenting the profile of the Panchayats were collected from the Vikasana Rekha of the concerned Panchayats.

3.4 Selection of Sample

As already stated, out of the 92 Grama Panchayats in Thrissur district, three Grama Panchayats namely Varantharapilly, Pananchery, and Mattathur were selected based on the highest area under cultivation of major crops. From these three panchayats, 90 farmers were selected by using stratified purposive sampling. The list of farmers of each of these three panchayats was collected from the concerned Krishibhavan and farmers were categorised into three strata, as small, marginal and large farmers based on their landholdings. From each category, 10 farmers were selected from each Panchayat using purposive sampling i.e., farmers who are undertaking cultivation of major crops like paddy, coconut, rubber, banana, nutmeg and arecanut only were selected. Thus a total of 90 farmers constitute the sample for the study.

3.5 Statistical tools used for the study

Data were analysed with the help of statistical tools such as simple percentages, scores and indices, Chi-Square test of independence and One-Way ANOVA. Chi-Square test of independence was used to check the independence of awareness, access and usage of ICT tools for marketing and credit information and types of farmers. One-Way ANOVA test has been used for analysing farmer category - wise marketing information needs and farmer category - wise frequency of use of ICT tools. Pearson's Correlation analysis has been employed to measure the relationship between socio economic profile of the farmers and ICT usage

3.5.1 Chi-Square Test of Independence

Chi-Square (X^2) is one of the very popular methods for testing hypotheses on discrete data. There are three types of chi-square analysis such as Chi-Square test for goodness of fit, Chi-square test for homogeneity and Chi-Square test of independence. Among them the commonly employed method is Chi-Square test of

independence and is used to test the hypothesis that two categorical variables are independent of each other. A small chi-square statistic indicates that the null hypothesis is correct and that the two variables are independent of each other.

The procedure involves comparing the observed frequencies with the expected cell frequencies. Observed cell frequencies are the actual number of cases falling in different cells of the contingency table and expected frequencies are the number of cases that should fall in each cell if there is no relationship between the observed frequency and the expected frequency of each cell of the contingency table. While observed cell frequencies can be directly obtained from the given data, expected cell frequencies are calculated by multiplying the total of the column to which the cell belongs and then dividing by the total sample size. Chi-Square statistic is calculated as

Let $O_{r,c}$ is the observed frequencies and $E_{r,c}$ is the expected frequencies, then the test statistic is

$$X^2 = \frac{(O_{r,c} - E_{r,c})^2}{E_{r,c}}$$

Along with the chi-square statistic, degrees of freedom associated with the contingency table were also calculated to find out the significance of the relationship and degrees of freedom and significance level were used to find values of chi-square from standard values. If the tabulated values is less than the calculated value, the null hypothesis is rejected and we conclude that there is some significant association between the two variables.

3.5.2 One-Way Analysis of Variance (ANOVA)

ANOVA or Analysis of Variance is used to compare the means of more than two population. ANOVA analysis uses F-statistic, which tests if the means of the groups, formed by one independent variable or a combination of variables, are

significantly different. It is based on the comparison of two estimates of variance- one representing the variance within groups, often referred to as error variance and other representing the variance due to difference in group means. If the two variances do not differ significantly, one can believe that all the group means come from the sampling distribution of means and there is no reason to claim that the group means differ. The F-statistic calculates the ratio between the variance due to difference between groups and the error variance

$$F = \frac{Variance\ due\ to\ difference\ between\ groups}{Error\ variance}$$

The larger the F-ratio, the greater is the difference between groups as compared to within group differences. An F- ratio equal to or less than one indicates that there is no significant difference between groups and null hypothesis (that the group means do not differ significantly) is correct. If the F-test proves the null hypothesis to be wrong, Multiple Comparison Tests are used to further explore the specific relationship among different groups.

One-Way ANOVA is the generalisation of the t-test for independent samples to situations with more than two groups. It is also known as single classification ANOVA or one factor ANOVA. It is used to test the difference in a single dependent variable among two or more groups formed by a single independent variable.

3.5.3 Correlation Analysis

Correlation is a measure of relationship between two variables. Correlation coefficient gives a mathematical value for measuring the strength of the linear relationship between two variables. It can take values from -1 to +1 with +1 representing absolute positive linear relationship, zero representing no linear relationship and -1 representing absolute inverse relationship. There are several mathematical methods of measuring correlation such as Karl Pearson's Method,

Spearman's Correlation Coefficient and Kendall's Correlation Coefficient. While Pearson's coefficient is commonly used for continuous data, the other two are used mainly for ranked data.

There are two types of correlation. Bivariate correlation and partial correlation. Bivariate correlation tests the strength of the relationship between two variables without giving any consideration to the interference some other variable might cause to the relationship between two variables being tested. In partial correlation, the extent of relationship between two variables factoring out the effect of one or more other variables is examined without throwing out any of the data.

Of the several mathematical methods of measuring correlation, Karl Pearson's Method known as Pearson's Coefficient of Correlation is the most widely used. It is given by

$$\text{Pearson's Correlation Coefficient} = \frac{\text{Sum of products of X and Y}}{[(\text{Sum of squares of X})(\text{Sum of squares of Y})]^{\wedge ½}}$$

Correlation coefficient lies between -1 and +1.

3.5.4 Index numbers

An index is a type of composite measure that summarises, ranks and orders several specific observations and represents some more general dimension. An index is an accumulation of scores from a variety of individual items.

Four indices were developed for the study and they are Information Index, Usage Index, Credibility Index and Constraints Index.

3.5.4.1 Information index

For measuring the information needs of farmers, information indices were developed. For the construction of information index, the respondents were asked to rate their information needs with respect to general agricultural information, marketing information and credit information on a five point scale ie, highly needed, moderately needed, no opinion, less needed, and not needed and the opinion of the respondents were assigned the marks of 5,4,3,2, and 1 representing highly needed information to not needed information

The scores of all the respondents for each information were summed up to arrive at the total score. The total score obtained by each information was then divided by maximum possible score for that information to obtain the index of that information.

$$\text{Information index} = \frac{\text{Total score obtained for information}}{\text{Maximum possible score of that information}} \times 100$$

Maximum possible score = Maximum score for the information x Total number of respondents

For finding out the information needs of sources of credit, average score was computed by dividing the total score of all statements under a source by the number of statements and ranked the source according to the average score.

Information needs index with respect to overall agricultural information, marketing and credit were calculated for marginal, small, large and total farmers. Information needs of the farmers were ranked based on the total information index.

3.5.4.2 Usage index

For measuring the usefulness and frequency of use of various ICT tools for getting marketing and credit information, usage indices were developed. For the construction of usage index, the respondents were asked to rate the frequency of use of each ICT tool for obtaining marketing and credit information on a five point scale ie, daily, weekly, occasionally, rarely, and not at all and the opinion of the respondents were assigned the marks of 5, 4, 3, 2, and 1 representing the most frequently used ICT tools to not at all. The score of all the respondents for each ICT tool were summed up to arrive at the total score. The total score obtained by each ICT tool was then divided by the maximum possible score for that ICT tool to obtain the index of usage of that ICT tool. Usage index for marginal, small and large farmers and total usage index were calculated separately.

$$\text{Usage index} = \frac{\text{Total score obtained for ICT tool}}{\text{Maximum possible score of that ICT tool}} \times 100$$

Maximum possible score = Maximum score for the ICT tool x Total number of respondents

For measuring the usefulness of the entire ICT tool by marginal, small and large farmers, overall index was developed for each category of farmers.

$$\text{Overall index} = \frac{\text{Sum of total score of all the ICT tools}}{\text{Maximum score x Number of respondents x Number of ICT tools}}$$

3.5.4.3 Credibility index

For measuring the credibility of each ICT tool, credibility index was developed. For the construction of credibility index, the respondents were asked to rate the credibility of each ICT tool on a five point scale ie, highly credible,

moderately credible, no opinion, less credible, and not credible and the opinion of the respondents were assigned the marks of 5, 4, 3, 2, and 1 representing most credible to not credible. The scores of all the respondents for each ICT tool were summed up to arrive at the total score. The total score obtained by each ICT tool was then divided by maximum possible score for that ICT tool to obtain the index of credibility of that ICT tool. Using credibility index, ICT tools were ranked.

$$\text{Credibility index} = \frac{\text{Total score obtained for ICT tool}}{\text{Maximum possible score of that ICT tool}} \times 100$$

Maximum possible score = Maximum score for the ICT tool x Total number of respondents

In addition to the above tools, simple percentages have also been computed to find out the share of each variable to the respective totals.

3.5.5 Global Positioning System (GPS)

A position information system enables the user to determine absolute or relative location of a feature on or above the earth's surface. Position data is reported in geo - referenced format such as latitude-longitude, state plane, Universal Transverse Mercator (UTM). One of the positioning information system that provide position data with acceptable degree of accuracy is Global Positioning System. GPS is the space and land - based information system to determine precise position data. It utilises military satellites to determine positioning space or land on the earth's surface. GPS receivers are used to decode the signals received from the satellites by the antenna. The display and storage facility integrated with the receiver helps in recording and reporting GPS data to the user numerically or graphically.

There are millions of GPS users in the world and it is the most common type of system in agriculture. In agriculture, the use of the Global Positioning

System provides benefits in geo-fencing, map-making and surveying. GPS receivers have dropped in price over the years, making it more popular for civilian use. With the use of GPS, civilians can produce simple yet highly accurate digitised map without the help of a professional cartographer. For various applications of GPS in agriculture there is acceptable accuracy requirement.

In the present study, the location of the respondents were collected using Global Positioning System. The latitude and longitude of location of each respondent were collected using GPS receiver at an acceptable accuracy requirement of ±5m.

3.5.6 Geographic Information System (GIS)

Geographical Information System is a computer software that is capable of storing, analysing, and displaying geographically referenced information i.e., data identified according to location. GIS is able to relate different information in a spatial content and allow the user to reach a conclusion about this relationship. GIS produces maps that are used all over the world in every field imaginable. Foresters, engineers, agricultural producers, and police are just some of the people that use GIS.

Regarding the working of GIS, all data collected uses a location reference system. Examples of location reference are longitude and latitude, or legal land locations. Data collected at a particular location can be compared with other information, and through these relationships, conclusions can be made to explain and predict future occurrences. GIS allows the decision maker to visualize and understand the relationships of information inputted to make better management decisions.

A GIS makes it possible to link, or integrate, information that is difficult to associate through other means. GIS can be used to combine aerial photographs, tabular data, digital satellite data or numerous other forms of data to display a spatial representation of all this information. GIS is extensively used in agriculture, especially in precision farming. Land is mapped digitally, and pertinent geodetic data

such as topography and contours are combined with other statistical data for easier analysis of the soil. GIS is used in decision making such as what to plant and where to plant using historical data and sampling.

In the present study, the locations of the selected farmer respondents in the sample panchayats were plotted in a map using GIS. In addition to this, the locations of the banks, other financial institutions and markets on which the farmers depend, were also plotted in different maps while analysing the marketing and credit information needs of the farmers.

The analysis part of the thesis in accordance with the objectives of the study using the methodology explained above are presented in the ensuing chapter.

RESULTS AND DISUSSION

CHAPTER 4
RESULTS AND DISCUSSIONS

Knowledge management can play a pivotal role in enhancing agricultural productivity and addressing the problem of food insecurity. If properly managed, it enables appropriate knowledge and information to reach the knowledge intermediaries and farmers in a timely manner. Such delivery of knowledge and information undoubtedly minimises the risk and uncertainty that farmers face from production to marketing of their produce. But, to successfully engage in agricultural knowledge management, adequate mechanisms are needed for generating, capturing, and disseminating knowledge and information through the use of effective processes and institutional arrangements.

Sources of agricultural knowledge include scientific research and indigenous knowledge. After creation, sourcing and accumulation of knowledge, it has to be disseminated to users to support the innovation process. Information and Communication Technology (ICT) can play a critical role in facilitating rapid, efficient, and cost effective knowledge management. To speed up technology adoption, government needs to quickly review and modernise its public extension service delivery system and particularly the agricultural extension system, and provide an enabling framework for utilising advances in ICT. Using available ICTs will not only improve information and knowledge management for extension workers and farmers but optimise and rationalise public resources devoted to agricultural extension services.

The discussion of the analysis of the present study undertaken with the objectives of assessing the information needs of farmers with respect to marketing and credit, the extent of use of ICT for obtaining these information by them, and their constraints in the adoption of ICT tools has been depicted under twelve main

sections. Since the extent of use of ICT by the farmers for getting agricultural information primarily depends on the availability of ICT tools, an understanding of the available initiatives and tools in agriculture is absolutely necessary, which forms the first part of this chapter. The study has been conducted using primary data collected from 90 farmers. A picture about the socio – economic characteristics of the respondent farmers is highly essential especially in the context of finding out whether there is any significant relation between these characteristics and the extent of use of ICT. Hence the discussion of the socio – economic profile of the respondent farmers forms the second section of this chapter. The third section is devoted for precisely detailing the distinctive features of the agricultural operations of the respondent farmers. The fourth section details the overall agricultural information needs, awareness, access and gap from the farmers' point of view. The fifth and sixth parts discuss the first objective of the study divided into two sections i.e., marketing and credit information needs of the farmers respectively. Sections seven to twelve deal with the different dimensions of the second objective, viz. analysis of the extent of use of ICT tools for meeting marketing and credit information needs of farmers. The next section discusses the third and last objective of the study detailing the constraints of farmers in using ICT tools followed by a critical examination of the Market Information System of Vegetable and Fruit Promotion Council of Keralam (VFPCK), the initiative of the Government of Kerala for providing market information and farmers' market for their produce. The suggestions emanating from the study forms the last part of this chapter.

As such, the chapter is presented as follows:

4.1 Information and Communication Technology in agriculture: Initiatives and tools

4.2 Socio – economic profile of the respondent farmers

4.3 Distinctive features of the agricultural operations of respondent farmers

4.4 Overall agriculture information needs, awareness, access and gap: Farmers' perspective

4.5 Marketing information needs of farmers

4.6 Credit information needs of farmers

4.7 Extent of use of ICT tools for marketing information

4.8 Extent of use of ICT tools for credit information

4.9 Comparison of usage of ICT tools for marketing and credit information

4.10 Print and electronic media for agricultural information: Usage pattern of farmers

4.11 Constraints in using Information and Communication Technology tools

4.12 Market Information System of Vegetable and Fruit Promotion Council Keralam

4.13 Suggestions for effective use of ICT

4.1 Information and Communication Technology in agriculture: Initiatives and tools

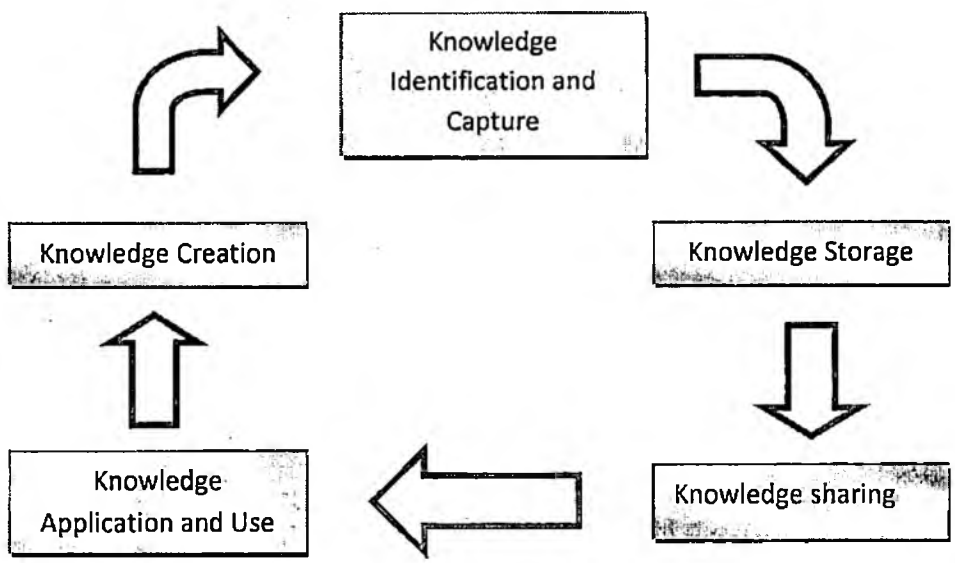
Knowledge is considered as the fourth production factor after labour, land and capital and is particularly critical in the agricultural sector. Making relevant knowledge accessible to the farming community helps improve production and productivity, and brings higher returns. If the agricultural practice of farmers is not backed up by modern agricultural knowledge and information, agricultural households are likely to remain trapped in low productivity, food insecurity and poverty. Generating new agricultural knowledge and information and making it available for use by farmers is important in promoting sustainable livelihoods and reducing rural poverty.

4.1.1 Knowledge and information management in agriculture: Concept and tools

Knowledge management can be defined as the fact or condition of knowing something with a considerable degree of familiarity acquired through experience, association or contact. Knowledge consists of the attitudes, cumulative experiences, and developed skills that enable a person to consistently, systematically and effectively perform a function. It is an integration of explicit and tacit knowledge.

Explicit knowledge refers to all aspects of formal, systematic, recorded, communicated and shared knowledge that is made accessible through a variety of information delivery systems. Tacit knowledge on the other hand is highly personal, created by doing, trial, error, reflection and revision. Agricultural knowledge is also created from modern and indigenous sources. The modern knowledge is created through scientific research, and therefore it is explicit knowledge, by universities and research institutes. Indigenous knowledge or tacit knowledge, on the other hand, refers to traditional knowledge, innovations and practices of local communities and is developed outside the formal education system. Knowledge management encompasses processes and practices concerned with the creation, acquisition, sharing and use of knowledge, skills and expertise and follow a circular flow and a non – stop process that continuously updates itself. Figure 4.1 illustrates the knowledge management process.

Fig 4.1 Knowledge management process



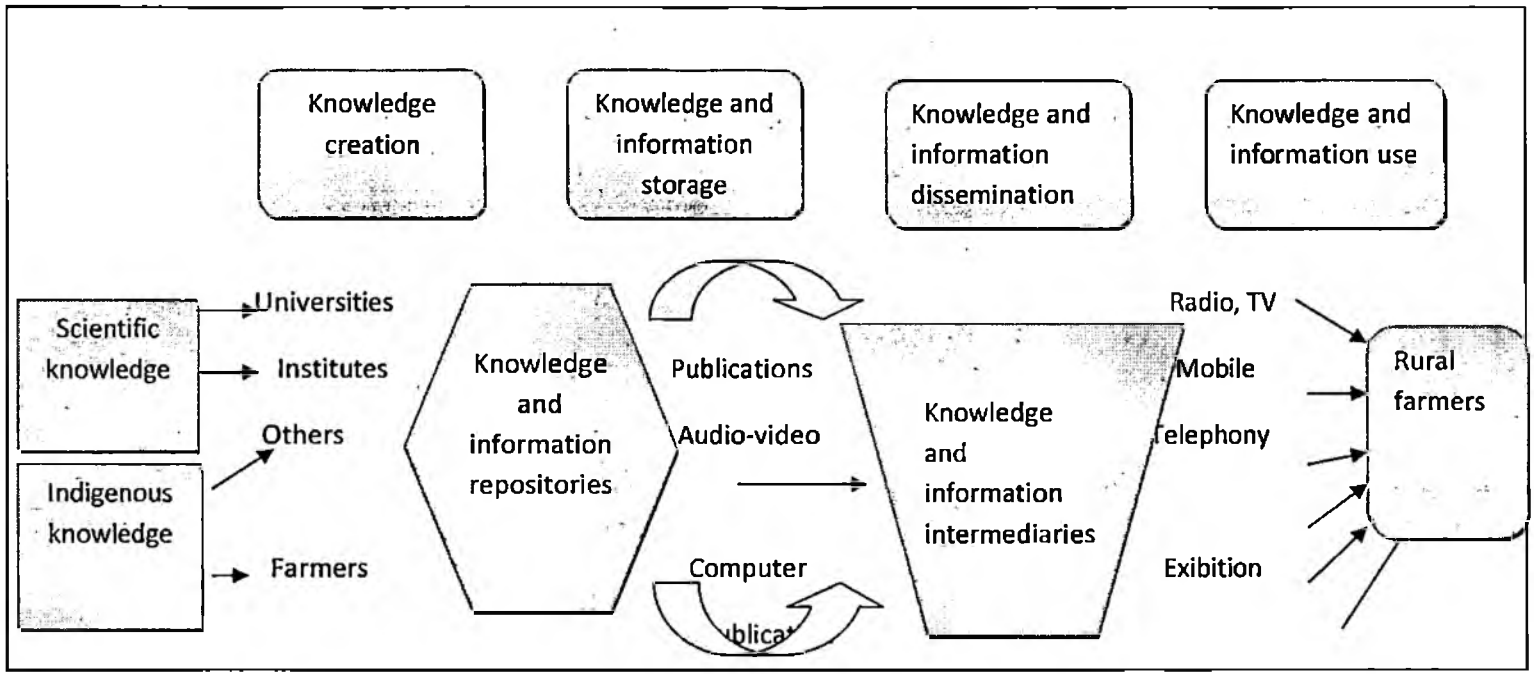
Source: Cong *et al.* (2007)

For the circular flow of knowledge management to take place, knowledge, which is sufficiently better than the existing knowledge, and means for transmitting it must be both available. In addition, the consumers of knowledge must be willing and able to use the better knowledge that is now available.

Various institutions and organisations are engaged in the creation, collection, storing, and dissemination of agricultural knowledge and information. The most notable ones, in terms of having direct linkage with the farmers, are institutes of agricultural research and the Ministry of Agriculture. Agricultural research institutes are the prime source for the creation of agricultural knowledge and information in the country. The creation of information and knowledge management by these institutes begin with the identification of information and knowledge needs or gaps, and the capturing, storage, and sharing / dissemination of the knowledge to the users. Identification of the demand for knowledge and information is conducted through a participatory approach with the involvement of stakeholders, namely, farmers, researchers and extension experts, among others. The knowledge and information that farmers demand ranges from accessibility of new farming methods, availability of weather forecast and supply as well as price of inputs and outputs, among others.

Agricultural information and knowledge created from various sources are stored in various forms before they are disseminated for use. The main repositories of such knowledge include publications, audio visuals, and websites. The stored knowledge and information are then disseminated to users, such as rural farmers, through intermediaries, especially during trainings, field visits and exhibitions, and also through publications, traditional forms of ICT like television and radio, and modern forms of ICT like internet and mobile phone. Thus, several repositories and intermediaries play their role to bring the information and knowledge to the ultimate users. Figure 4.2 shows the flow of agricultural knowledge and information from creation to end use

Figure 4.2 Flow of agricultural knowledge and information management in agriculture



Source: Cong *et al.* (2007)

Effective knowledge management is achieved when the right knowledge and information is delivered to the right person at the right time in a user friendly and accessible manner that help the recipients to perform their jobs efficiently. The outcome of effective knowledge management include improved productivity and performance of the agricultural sector. The attainment of effective knowledge management in the agriculture sector requires the systematic and continuous interaction of stakeholders that include farmers, farmer organisations, research scientists, policy makers, extension agents and the private sector among others.

4.1.2 ICT initiatives in agriculture across the world: An overview

ICT can play a crucial role in benefiting the resource - strapped farmers with upto date knowledge and information on agricultural technologies, best practices, markets, price trends, and weather conditions. The experiences of most countries indicate that rapid development of ICT, which facilitates the flow of data and information, has tremendously enhanced the knowledge management practice in agriculture. However, in most of the developing countries, the use of ICT for the accumulation and dissemination of knowledge and information is still low. Currently, among the various ICT related initiatives, radio is widely used to share and inform users on agricultural matters, including new and upgraded farming techniques, production management, market information, and other issues. Apart from such traditional ICT tools of radio and TV, the use of modern ICT tools like computer, internet, mobile phone etc. are being used. Some initiatives that make use of ICT tools in agricultural knowledge and information management at the international level are discussed in the ensuing paragraphs.

4.1.2.1 Farm Radio International

Farm Radio International is a Canadian charity working with more than 500 radio partners in 38 African countries to fight poverty and food insecurity. They

develop radio scripts, information packages, a weekly electronic news service, and a special on-line community called Barza, and share them with thousands of African broadcasters. The broadcasters, in turn, use these resources to research, produce and present relevant and engaging programmes for their audience of tens millions of farmers.

4.1.2.2 Farmer Voice Radio

Farmer Voice Radio (FVR) represents a different, sustainable model of agricultural extension in Africa that overcomes many of the limitations of traditional extension by linking extension officers, and farmers, with radio and other information and communication technologies to enhance farmer productivity and prosperity. FVR was launched in Kenya and Malawi in 2009. In 2011, it was introduced in Tanzania and Uganda. FVR has successfully developed business partnerships among extension servicers and broadcasters.

4.1.2.3 The Rural and Agricultural Development Communication Network

The Rural and Agricultural Development Communication Network (RADCON) is an innovative rural communication system established in Egypt on 15th September, 2011. RADCON operates on Participatory Rural Communication Appraisals (PRCA) for the formulation of communication strategies at community level, to expand the use of multi-media and new ICTs by rural mass. This integrated approach is comprised of two main components that are closely inter-connected:

- An online agricultural and rural development information and communication system.
- A wide network of focal groups and village facilitators, in seven governorates of Egypt.

4.1.2.4 Kenya Agricultural Commodity Exchange

The Kenya Agricultural Commodity Exchange (KACE) allows trading on spot markets for agricultural commodities through its internet-based auction exchange, and sends the price information on mobile phones through a branded service – SMS Sokoni, in partnership with a leading mobile phone service provider, Safaricom Ltd. Farmers can access market information such as commodity prices in different markets, who is buying or selling what commodity, at what prices, where and when. Taking a step further, the Bolivian Export Promotion Centre (CEPROBOL) offers an e-commerce platform to link small export companies and producers via the internet.

4.1.3 ICT initiatives for agricultural development in India

Though ICT for agricultural development has a huge potential, India is a slow starter and very few projects have been undertaken. NGOs, private organisations, corporate bodies and governmental organisations have generally taken the initiative. A brief description of some of the programmes run through different ICT tools are deliberated in the following sections.

4.1.3.1 Internet enabled computer centres

Internet is a world-wide computer network that can be accessed via computer, mobile telephone, games machine, digital TV etc. In India, the internet penetration has increased from 10.2 per cent in 2013 to 19 per cent in 2014 with 24.3 crores of people having internet connection. India's share in world's internet users are 8.3 per cent (Internet Live Stat, 2014).

The National Agriculture Policy lays emphasis on the use of IT for achieving a more rapid development of agriculture in India. In pursuance thereof, the Department of Agriculture and Co-operation is in the process of preparing a National e-Governance Plan in Agriculture (NeGP-A) for a more focused implementation of e-

governance activities in the agriculture sector. The internet enabled computer centres include kiosks, knowledge centres, common service centres, telecentres etc. and they are disseminating agricultural information and providing training in computer skills. There is wide variation in content, depending on the objective of the centre, ownership, governance, revenue models etc. Information delivered through these centres include information on government services, market prices, technology, weather, and availability of inputs. Brief details of major internet enabled computer centres for agriculture information in India are given below.

(a) Village Resource Centres and Village Knowledge Centres

In India 473 Village Resource Centres (VRCs) have been set up in 22 States/Union Territories. The VRCs are connected to Knowledge / Expert Centres like Agricultural Universities and Skill Development Institutes (SDI). Over 6500 programmes have been conducted by the VRCs in the area of agriculture/horticulture, fisheries, livestock, water resources, tele-health care, awareness programmes, women empowerment, supplementary education, computer literacy, micro credit, micro finance etc. There are 101 Village Knowledge Centres (VKCs) functioning in Tamil Nadu, Puducherry, Maharashtra, Orissa, Andhra Pradesh and Kerala. VRCs and VKCs working with 315 partners for implementation and location specific content generation.

(b) Community Information Centres and Common Service Centres

Community Information Centres (CIC) which exist in North-East India is providing e-infrastructure for accessing rural information needs of farmers and others. It provides information on forms, rules and procedures, government tenders, notifications for employment opportunities, information on tourism, culture, schemes, legal issues, guidelines for bank loans, weather information etc. Common Service Centres (CSC) provide web enabled e-governance services, including agricultural information to rural areas.

(c) Bhoomi

Bhoomi is the e-governance project of the Government of Karnataka. The major highlight of this project is that it is a fully online system to carry out mutations on land record data. Under this initiative, 20 million land records of 6.7 million land owners in 176 taluks of Karnataka have been computerized (Chauhan, 2010). It ensures total transparency in land records administration with added advantage of security and reliability. Based on the overwhelming success of Bhoomi project, computerisation of land records are now made mandatory for all the states in India. There is a land record centre in each taluk office for public interface with provision for interfacing of Touch Screen Kiosk.

(d) Online information system of commodity exchanges in India

The fluctuation in prices during the harvesting period has always been a major concern for the farming community. Futures trading have emerged as a viable option for providing a greater degree of assurance on the price front. In India, farmers do not directly participate in the commodity futures market. But they take advantage of the price signals that are derived on the futures market. Long duration futures contract help farmers to take decision about cropping patterns based on price signals. Moreover, the dissemination of the futures prices at the exchange improves the bargaining power of the farmer. In India, the Multi Commodity Exchange of India Ltd (MCX) Mumbai, the most popular commodity exchange, offers more than 40 commodities across various segments such as bullion, ferrous and non ferrous metals, and a number of agricultural commodities on its platforms.

In order to benefit the farmers from a holistic point of view, MCX initiated the "Grameen Suvidha Kendra" (GSK) model in collaboration with the Indian Postal Department. This provides various facilities such as price/market information, addressing technical queries regarding farming, providing scientific warehousing facilities, warehouse receipt issuance and access to finance, quality inputs, and bank

loans. This also provides for flexibility in terms of adding more such services that provide value to the rural economy and service its needs. While the entire motive behind this initiative has been to reach the exchange discovered prices to the farmers, it was planned to add more value-added services not only to enrich the rural economy but also to make this initiative a self-sustainable one

GSK runs on a 'hub and spoke' model supported on the hub by a kiosk set up and aided at the back end by the physical structures of post offices. Post offices disseminated the price information through black boards and acted as service providers for other services through the hubs, and at the same time helped the initiative to overcome difficulties such as connectivity and power availability. While these kiosks serve as community-based tools for providing value addition to the farming community that access them, mobiles have become personalised tools to deliver information and services that could add value to the farming community. Keeping this in mind, MCX has strategically tied up with the government-owned service providers, Bharat Sanchar Nigam Limited (BSNL) and Mahanagar Telephone Nigam Limited (MTNL (MTNL), covering the entire geography of the nation to provide its real spot and futures prices on the mobile platform. MCX also went a step ahead to tie up with Tata Indicom to provide this price information on their Interactive Voice Response (IVR) platform on a toll-free basis. While trading in futures on mobile phones is a possibility today, its high cost of access prevents this personal communication tool from becoming an enabler in India.

(e) Warana Wired Village

In the Warana Wired Village Project covering 70 villages in Maharashtra, the existing cooperative structure has been used with state of the art infrastructure to allow internet access to existing cooperative societies. The aim is to provide information to villagers by establishing networked booths in the villages. The villages in the sugarcane-growing region have computers that are linked to a central network

that provides farmers access to essential pieces of information such as the ideal time for planting and harvesting sugarcane, the current market rates of their produce, and payments made by the factories. The Central and State governments together have funded 90 per cent of the Project.

The computer network has put an end to a major reason for anxiety at harvest time. The computer network provides each farmer with a share code. By punching the code into the system, the farmer gets details such as when the crop was planted and when it is due for harvesting. This gives the farmer sufficient time to organise workers to cut and transport the sugarcane. The network also gives details of farmer's transactions with the local sugar and milk cooperatives and helps them compare sugarcane prices in different parts of the country. The computer kiosk has made several tasks easy and less tedious for the sugarcane farmers. The computers at the sugar factory's weighbridge feed the crop's weight into the farmer's file through his share code. A receipt is issued to the farmer or the transporter. The farmer can check his payment status at the computer booth. The booths are located at the milk collection centres in the villages. The sugar factory pays Rs.150 every month for the use of the 12 foot x12 foot room that houses the computer. The service is free for farmers.

(f) e-Choupal

e-Choupal is an initiative of Indian Tobacco Company (ITC) Limited, to link directly with rural farmers through the internet for the procurement of agricultural and aquaculture products like soybeans, wheat, coffee, and prawns. e-Choupal tackles the challenges posed by Indian agriculture, characterised by fragmented farms, weak infrastructure and the involvement of intermediaries. The programme installs computers with internet access in rural areas of India to offer farmers up-to-date marketing and agricultural information.

ITC Limited has provided computers and internet access in rural areas across several agricultural regions of the country, where the farmers can directly negotiate the sale of their produce with ITC Limited. Online access enables farmers to obtain information on mandi prices, and good farming practices, and to place orders for agricultural inputs like seeds and fertilizers. This helps farmers improve the quality of their products, and helps in obtaining a better price.

Each ITC Limited kiosk having internet access is run by a sanchalak - a trained farmer. The computer is housed in the sanchalak's house and is linked to the internet via phone lines or by a Very Small Aperture Terminal (VSAT) connection. Each installation serves an average of 600 farmers in the surrounding ten villages within about a 5 km radius. The sanchalak bears some operating cost but in return earns a service fee for the e-transactions done through his e-Choupal. The warehouse hub is managed by the same traditional middle-men, called samyojaks, but with no exploitative power. These middlemen make up for the lack of infrastructure and fulfill critical jobs like cash disbursement, quantity aggregation and transportation.

Since the introduction of e-Choupal services, farmers have seen a rise in their income levels because of a rise in yields, improvement in quality of output, and a fall in transaction costs. Even small farmers have gained from the initiative. Farmers can get real-time information despite their physical distance from the *mandis*. The system saves procurement costs for ITC Limited. The farmers do not pay for the information and knowledge they get from e-Choupals; the principle is to inform, empower and compete.

e-Choupal' is the largest initiative among all internet-based programmes in rural India. It reaches to over 4 million farmers of more than 400000 villages through 6500 kiosks. It operates across ten states, namely Madhya Pradesh, Haryana, Uttarakhand, Karnataka, Andhra Pradesh, Uttar Pradesh, Rajasthan, Maharashtra,

Kerala and Tamil Nadu in the cultivation of soybeans, coffee, wheat, rice, pulses, and shrimp (Aker, 2011).

4.1.3.2 Agricultural Web Portals

Agricultural portals have been established as an electronic network in collaboration with various agencies. The information on the technology package at village level are made possible to the farmers through these portals. This section briefly details some of the important agricultural web portals available to the farmers at the national level.

(a) Agricultural Marketing Information System Network

Agricultural Marketing Information System Network (AGMARKNET) links all important Agricultural Produce Market Committees (APMCs), State Agricultural Marketing Boards/Directorates, and regional offices of Directorate of Marketing and Inspection (DM1) located throughout the country, for effective information exchange on market prices related to agricultural produce. Through this web based information system, farmers have the choice to sell their produce in the nearest market at remunerative prices. The AGMARKNET portal provides information on *(i)* prices and arrivals of agricultural commodities at various mandis in eight Indian languages; *(ii)* trend analysis of prices and arrivals at market/district/state levels; and *(iii)* grading, packaging, standards, sanitary and phytosanitary requirements, and marketing charges. Over 300 commodities and 2000 varieties from 1500 markets were being covered during the Eleventh plan (GOI, 2012). More commodities/varieties would be covered on a need basis. Information on prices and arrivals is updated on a daily basis. Conversion of this portal into other regional languages is in progress. A GIS-based National Agricultural Market Atlas for providing information on areas of production, movement, storage and market/consumption centres, is also in the process of development.

(b) Agropedia

Agropedia is a peer-group tool for interaction among farmers. This is a comprehensive, integrated model for digitalised content of agricultural domain. This e-initiative intends to bring together a community through ICT enabled knowledge creating and organising platform with an attempt to leverage the current agricultural extension system. IIT Kanpur (agropedia platform), Indian Institute of Technology (IIT) Bombay and Indian Institute of Information Technology and Management (IIITM) Kerala (multi-model delivery) are the three key partner organisations who are in charge of different projects and responsibilities along with International Crop Research Institute for the Semi-Arid Tropics (ICRISAT)- Hyderabad, National Academy of Agricultural Research Management (NAARM)- Hyderabad, Govind Ballabh Pant University of Agriculture and Technology (GBPUAT)- Pantnagar, under the aegis of the National Agricultural Innovation Project (NAIP). ICRISAT is the consortium leader, which is responsible for the outputs and deliverables.

Agropedia has been labelled as one stop solution for the Indian agro-sphere. Defining and developing knowledge - models for understanding of the crop has been done first time ever in the world in order to accumulate codified and approved information about the crops with the support of Food and Agriculture Organisation (FAO), Rome. These models use symbols for tagging a particular piece of information and relationships between them. Following this, knowledge – models for chickpea, pigeon pea, sorghum and groundnut are developed at ICRISAT, wheat, sugarcane, litchi and vegetable pea at GBPUAT and rice at Indian Institute of Technology Kanpur (IITK).

(c) Agricultural Resource Information System

Agricultural Resources Information System (AgRIS) is a Central Sector Scheme for strengthening / promoting agricultural information system in the Department of Agriculture and Cooperation (DAC), Ministry of Agriculture. This

Project is based on the recommendation of the Report of the Core Group - V of the Standing Committee on Agriculture and Soils, National Natural Resources Management System (NNRMS) of the Planning Commission, 2000. It develops a comprehensive database on various parameters related to land use, inputs (seeds, fertiliser, agricultural technology, and agricultural credit) use, water use and decision support systems (DSSs) packages for strengthening advisory services to farmers. The AgRIS is a step towards establishing a location-specific e-Government mode for the poor.

(d) almost All Questions Answered

almost All Questions Answered or aAQUA is a farmer-expert Question and Answer database supporting Indian languages. It is an online multilingual, multimedia agricultural portal for disseminating information from and to the grassroots of the Indian agricultural community. The technology for aAQUA was developed by Developmental Informatics Laboratory, Kanwal Rekhi School of Information Technology (KReSIT), IIT Bombay and was sponsored by Media Lab Asia and Development Gateway Foundation's Research and Development Centre. aAQUA simultaneously addresses two major challenges in farmer outreach programmes viz, geographic reach and customised delivery. It answers farmers' queries based on the location, season, crop and other related information. An aAqua question is posted either by a registered user directly or through a telecenter / kiosk operator who has an account in aAqua. Usually the question is from a farmer whose profile information provides details such as crops, farm size, pesticides and fertilisers used, dosage etc. The prices of various commodities along with their varieties are displayed spatially over a map. The user can decide where to sell his produce to get the maximum profit, depending on the prices and the distance of the markets. aAQUA makes use of novel database systems and information retrieval techniques like intelligent caching, offline access with intermittent synchronization, semantic-based search, etc. Agricultural content repositories (Digital Library), Agri-price

information (Bhav Puchiye), farmer schemes and various operations- support databases (aAQUA-Q&S) have also emerged from the experience of aAQUA deployments. aAQUA's large scale deployment provides avenues for researchers to contribute in the areas of knowledge management, cross-lingual information retrieval, and providing accessible content for rural population. aAQUA is being spread geographically by building strategic partnerships with the state governments, kiosk network providers and agricultural expert organisations.

(e) Agriculture Resources Information System Network

Agriculture Resources Information System Network (AGRISNET) is a mission mode project funded by the Ministry of Agriculture, Government of India to develop a comprehensive online knowledge portal to disseminate relevant information to farmers. The Department of Agriculture and Co-operation is supporting e-governance activities at the State Agriculture and allied Departments through AGRISNET, a state sector mission mode project, which aims at providing improved services to the farming community using ICT. Financial assistance to States is also available for the preparation of AGRISNET projects. Under this Scheme most of the State Governments have established information - rich agricultural websites. Sikkim AGRISNET, Andhra Pradesh Agriportal, Uttar Pradesh Agrisnet Knowledge Portal, Tamil Nadu AGRISNET and Himachal Pradesh Expert Advisory Services are some of them. Typical services covered by State Governments in their AGRISNET projects include information on inputs, schemes of central and state governments, weather, land, crop management practices, agricultural markets, soil test results and weather and soil test-based agro-advisory services.

(f) Indian Farmers Fertiliser Cooperative Limited Agri-Portal

The Indian Farmers Fertiliser Cooperative Limited (IFFCO) is the world's largest manufacturers of fertiliser in the co-operative sector. Under IFFCO's agri-portal, sixteen states have been covered with information of relevance to farmers in local languages and can be accessed through IFFCO's website. User-friendly intuitive graphic based navigation is provided to facilitate viewing in touch screen environment. IFFCO has installed about 100 Farmers Information Kiosks in 16 states (Chauhan, 2010). Training programmes and meetings of farmers are conducted to encourage farmers to use the facilities provided in farmers' information kiosks.

(g) Agriwatch portal

Agriwatch was started by Indian Agribusiness Systems Pvt. Ltd (IASL), India's leading Agribusiness Information Services Company. The agriwatch.com is the largest agribusiness portal in India and enables access to a large amount of agribusiness related information covering more than 15 sub sectors within the agricultural and food industry. IASL conducts commodity research, trading, publishing, consulting and manpower recruitment in agriculture, food processing, social development and allied sectors. Daily, weekly and fortnightly Agriwatch trade research reports are published by IASL.

(h) iKisan Project

iKisan is the ICT initiative of the Nagarjuna group of companies, the largest private entity supplying farmers' agricultural needs. iKisan was set up with two components, the iKisan.com website, to provide agricultural information online, and technical centres at village level. The project operates in Andhra Pradesh and Tamil Nadu. Farmers are able to become members by paying Rs. 100 per year or Rs. 20 per month. Project services are available only to member farmers. The operators of the iKisan technical centres are agricultural graduates who act as the interface between

the computer networks and the farmers. They provide both on- and off-line information services. They collect online information from the iKisan.com website, and pass it on to the farmers. In addition, they assist farmers to access information from the CD-ROM, comprising a vast database, with which each centre is provided. The operators, being agricultural graduates, are able to diagnose, analyze and advise about diseases and pests. With their knowledge of both agriculture and ICT, they probably constitute the best part of this project. The major objective of iKisan is to provide need based solely agricultural expertise at village level, to increase the productivity of selected crops in selected regions.

(i) e-Sagu

e-Sagu is an IT based personalised agriculture extension system to improve agricultural productivity by disseminating fresh expert agricultural advice to the farmers, both in a timely and personalised manner. Agricultural experts get the information about the crop situation through internet in the form of both text and image data, and then generate the appropriate advice which is sent to the farmer through the internet.

A team of agriculture experts work at the e-Sagu main lab in collaboration with e-Sagu local centres. A local centre is established in about 10 villages. Each centre has coordinators who work on specifically assigned farms. The details for the farms, like soil data and data regarding water resources, are collected by the coordinator. The coordinator makes frequent visits to the assigned farms and takes photographs and sends them to the experts via email. By accessing the soil data, farmer's details, crop database and the information sent by the coordinators, the agricultural experts prepare and send the advice to the farmer within 24-36 hours.

(j) Gyandoot Project

The Gyandoot project was started in the year 2000 in Dhar district of Madhya Pradesh. It is a service delivery portal, which uses intranet-based system to connect to rural cyber cafes for giving global access to the everyday needs of the rural masses. It is managed by a society called 'Gyandoot Samiti' registered under the Madhya Pradesh Societies Registration Act. The intranet connects rural cybercafés/kiosks called Soochanalayas. Each Soochanalaya has a computer and its accessories, furniture and stationary.

The services are managed by an operator Soochak. The focus of the Project is to minimise the role of intermediaries by providing the appropriate price for the crop produce and utilise ICTs to improve governance at the village, block and district levels by fast and easy access of various types of forms and land records. The project involves villagers in decision making of various functioning bodies (Dwivedi and Bharti, 2010).

The Project provides various fee-based online services to the farmers, like cost of produced crops and current prices of major crops at local and other auction centres of the country. Rural e-mail facility is also provided along with 'Ask the Expert' facility, which comprises of group of experts in agriculture, animal husbandry, health, etc., to answer questions by farmers and villagers about their problems. Forms of government schemes are also available directly to the farmers at the Soochanalaya. Complaints/grievances for poor quality seeds, fertilisers, drinking water and functioning or non-functioning of schools or panchayats of the village can be filed by any farmer and is maintained and acted upon in a week.

After the discussion of the ICT initiatives for agricultural development through agricultural web portals, the dissemination of ICT enabled agricultural information to farmers through the medium of telephone is presented.

4.1.3.3 ICT initiatives through telephone

Telephone is a device that is used to submit and receive sound, most commonly speech, between two people. It has become one of the most common household items today. While infrastructure investments still remain problematic in our country, one of the dramatic change over the course of the past decade has been an increase in telecom network. The country today has an impressive telecom network both in the private and government sector. It has been felt that this impressive telecom network could be put to effective use for delivering knowledge and information to the farming community. Towards this end, the Department of Agriculture and Co-operation, Government of India, has been working on schemes to use both mass media and telecom network for the delivery of agricultural extension services.

With the growth of mobile phone coverage, many of these initiatives have used mobile phone to deliver services including Short Message Service (SMS) and internet-based services. In the last few years, there has been a proliferation of mobile phone - based application and services in the agricultural sector, providing information on market prices, weather, transport and agricultural techniques via, voice, SMS and internet. The important initiatives at the national level for delivering agricultural information to farmers using telephone, form the content of this subsection.

(a) Kisan Call Centre

The Department of Agriculture and Co-operation, Ministry of Agriculture, Government of India in association with Telecommunication Consultant of India Ltd (TCIL) launched Kisan Call Centres Scheme on 21st January 2004 to leverage the extensive telecom infrastructure in the country to deliver extension services to the farming community. The Call Centre is an effort to synergise ICT with agricultural technology. It is aimed to optimally utilise the strengths of both these systems and

dovetail it with the specialised Subject Matter Specialists (SMS) knowledge of Agricultural Scientists and Extension Officers in order to facilitate its reach to the farming community. The Kisan Call Center can be reached through dialing toll free number 1551 from anywhere in the country. The Call Center is geographically divided into 12 locations to answer the farmers' query in the local language.

The KCC consists of three layers. Call is received at Level-1 and if the receiver cannot answer it, then it reaches to SMS at Level-2 through teleconferencing. Generally the questions are answered instantly but sometimes it is answered within 72 hours if it cannot be answered at Level-2.The first level operator is an agricultural graduate with rural background proficient in the local language, which answers a majority of the farmers' query. The Subject Matter Specialists are located at second level that answers the farmers' query by checking the question entered at level one. Level three takes up call, which remain unanswered at the first two levels. At this level, the replies are sent to farmers through post/e-mail/fax/telephone in consultation with the concerned specialist within three days.

(b) LifeLines India

The LifeLines India service was born of a dream to create a digital inclusion programme that would make a real difference to people's lives in rural India by improving their access to technology and information, and narrowing the digital divide for them. This was realised in September 2006 when LifeLines India was launched, as a novel ICT-led helpline, under the founder partnership of British Telecom, Cisco Systems and OneWorld. The Programme commenced with strategic objectives to increase livelihood and income opportunities for rural communities through access to key decisive information and create a sustainable delivery model by concurrently creating a contextual knowledge base as information exchange takes place through the service. LifeLines India leverages a mix of internet and telephone technologies - to provide essential and demand-based information, advice and

guidance to remote and rural communities in India - through the medium of "voice, in the local language and within 24 hours". The service covers two of India's very primary sectors - Agriculture and Education.

The LifeLines – Agriculture service responds to the information need of farmers by providing advice and guidance to them through critical agri – advisory and livelihood information. In an easy-to-use process, LifeLines links up rural users through the medium of phone to experts in various fields, whom they can consult for their day to day queries. This modest initiative has at present flourished into an impressive programme for grassroots knowledge delivery. The service has cumulatively completed 10 crop cycles and reaches more than 150,000 farmers in 1000 villages (http://lifelines-india.net/).

(c) IFFCO Kisan Sanchar Limited

IFFCO, a cooperative of about 40,000 societies and 55 million farmers felt its role of helping the Kisan in attaining inclusive development through creating awareness in them by communicating through mobile telephones. To achieve this goal, it promoted an enterprise named IFFCO Kisan Sanchar Limited (IKSL) and converted mobile phones into a dynamic powerhouse of knowledge, to change the living conditions of the poor. IKSL aims to empower Indian farmers with pertinent information by leveraging mobile phone and improving informed decision making by farmers which could result in reduction in production cost, improvement in quality of farm produce, increase in farm income, and enhancing opportunities for livelihood.

IKSL focus on communication requirement of rural India through the mobile operator Bharti Airtel, besides providing agriculture related information to enable villagers take right farming decisions. The services provided to farmers include, telecom products and services of Airtel, free daily voice updates on mandi prices, farming techniques, weather forecasts and fertiliser availability. They also provide dedicated helpline for farmers to answer their queries. The subscribers of

Green Subscriber Identity Module (SIM) card of IKSL have the privilege of access to a dedicated helpline service, which has the potential to become a rural lifeline through a 6 digit number 534351. Farmers can get a solution to their problems and queries by using this short code. Subscribers receive five free recorded voice messages in regional languages prepared by experts everyday covering diverse area such as soil management, crop production, horticulture, market rates, weather forecast, government schemes etc. Call back facility is also provided to the subscribers of Green SIM card of IKSL.

***(d) Tata Consultancy Services'* mKRISHI®**

Despite the penetration of mobiles phones in rural areas, the potential to leverage it for crucial information dispersal and provision of valuable services remain largely unexplored. This has been due to various constraints including diversity in language and the inability to localise and personalise services in order to address individual needs. Understanding these intricacies, the Rural Service Delivery Platform of the Mobile Agro Advisory System of Tata Consultancy Services known as TCS' **mKRISHI®** uses mobile technology to cater to the absolute needs of the rural sector. It offers personalised advisory services in voice and visual media and connects farmers with a variety of stakeholders packaging multiple services through communication devices like mobile phones. It can also integrate wireless sensors and script technology with communication devices to provide an enhanced solution. mKRISHI® ensures significant business benefits to the stakeholders by enabling them to reach the farmers directly. Apart from the technological innovation, mKRISHI® has enabled the possibility for information exchange between various stakeholders of the rural economy. Many agri-input companies, rural banks, insurance companies, governments and agricultural universities find it convenient and economical to reach a group of or individual farmers using TCS' mKRISHI® platform.

(e) Reuters Market Light

Reuters Market Light (RML) is a pioneering mobile phone based, highly personalised, professional information service specially designed to support the farming community. It provides expert information to farmers at every stage of their crop cycle, right from pre-sowing to selling of the crop thus enabling them to take informed decisions. Farmers receive crop advisory, taluk-specific weather forecasts, local market price information, local and international commodity information and any other agri-rural information relevant to the farming community, direct to their mobile phones.

RML is sold as an easy-to-use card (RML Direct) in thousands of retail outlets in rural India. RML was launched in India in the state of Maharashtra on October 1, 2007, by the then Union Minister of Agriculture of India, Mr. Sharad Pawar. Presently, RML operates across 13 states in India and covers over 300 crops and varieties and 1300 markets across these States. RML has enjoyed unprecedented success with nearly 1.3 million registered unique subscribers in over 50,000 villages. It is estimated to have been utilised by 4 million farmers through using and sharing. Individual farmers have reaped significant return on their investment achieving upto Rs200,000 of additional profits, and savings of nearly Rs 400,000 by using RML (http://rmlglobal.com/).

4.1.3.4 Agricultural broadcast through radio

Radio is a powerful communication tool. India's post-independence experiments with ICT use in agricultural development started with radio. A network of All India Radio (AIR) stations were established across the country that broadcast agricultural programmes in regional languages. AIR, currently known as Prasar Bharathi, has been playing a significant role since many years, bringing new technological information on agriculture and other allied subjects to the farmers. With the recent liberalisation of the broadcasting licensing policy, Community Radio has

received a new impetus in India. This form of participatory communication has proved to be very successful as a tool for social and economic development at grass root level. The local community needs which are often neglected by the mainstream media could be adequately addressed by community radio.

(a) Farm and Home Broadcasts of All India Radio

The commitment of All India Radio to the rural audience dates back to more than 50 years. Realising the contribution of radio towards reaching new agricultural technologies to the farmers of United States of America in 1966, the then Union Minister of Agriculture of India, Bharat Ratna C. Subramaniam played an instrumental role in introducing Farm and Home Units at seven AIR stations in the country. This marked the beginning of a new era of farm broadcasting in India. All India Radio has been dedicated to the service of farming community since the very beginning of its 'Farm and Home Unit' in 1966.

The Farm and Home Programmes were started with a view to serve the farming community by motivating them through sustained broadcasts, to adopt and practice scientific methods of cultivation, for increasing food production and rural economic development. All stations of All India Radio broadcast Farm and Home programmes directed at rural audience. In fact, special programmes have been designed to cater to the day to day seasonal needs of the farming community. Programmes are designed based on the local day to day needs of the farming community incorporating latest information and technology for best agricultural output. These programmes create awareness about the ways and means to improve the agricultural productivity and quality of the country's farming community. The farm programmes are having many programme formats, like talks, interviews, discussions, dialogues, symposia, debates, farm based poetry recitations, features, radio reports, question and answer programmes, skits, quiz, jingles, farmers and

experts group discussions etc. At present programmes are broadcasted for duration of one hour per day which covers agriculture and allied subjects.

Farm and Home Units are conducting Farm School on the AIR lessons for the benefit of farmers. Farmers who have participated in various Farm School broadcast have now become beacon lights in various farming activities like turkey farming, poultry farming, organic farming and water management. The farm school broadcast has been very successful as it helps the farmers to gain the latest technical knowledge and information on various subjects and ultimately enable to enhance their skill in their farming operations and to become successful farmers.

(b) Community Radio Services of Krishi Vigyan Kendras

In India, where literacy remains a substantial barrier to development, community radio, can reach a large number of poor people because it is affordable and uses less electricity which is low in supply in many areas. Krishi Vigyan Kendras (KVKs) attempt to make best use of this most widely available but least explored communication technology. KVKs offer radio broadcast services for farming communities, encourage farmers to listen and to provide their feedback on the agriculture broadcast. This helps KVKs to improve their services further, based on the needs of the farmer communities. One of the greatest advantages of community radio is that programmes can be produced in the local language of the people that will make the radio station even more popular to the advantage of KVK. A single issue can be broadcasted in different formats and depending on the subject, one or more formats can be used for the same subject. Some such programme formats are drama, features, interviews, documentary, editorial etc.

4.1.3.5 Agriculture information through television

Television as a mass medium is an institutionalised source of information for creating awareness about the innovations. It is one of the most versatile audio-visual

aids ever developed. Like other media, television has the capability to reach simultaneously millions of people. Hence television provides excellent learning opportunity to rural farmers.

Farm programmes on television started with the introduction of Krishi Darshan Programme in 1967. With the launching of Satellite Instructional Television Experiment (SITE) in 1975 and Indian National Satellite System (INSAT) in 1982, farm programmes became familiar to a vast majority of rural viewers. Apart from Krishi Darshan, there are many programmes telecasted by different television channels all over the country.

4.1.3.6 Farm journalism for agricultural information

Farm journalism plays a vital role in modernising Indian agriculture. The increase in literacy rate, changing agricultural scenario and fast changing technologies call forth dissemination of agricultural information to farmers at a faster rate, bringing out the relevance of publication of farm magazines / agricultural journals. The farm / agricultural journalism is concerned with the twin objectives of imparting agricultural information to the farming community and getting genuine problems of farmers as feed back to researchers. A glance of the Indian Press indicates that it has gone through several stages of transformation over the last 67 years after gaining independence from the British in 1947. Technological changes have brought in a wide range of development among newspapers.

During 'Krishimela' and similar meetings of farmers even the illiterate farmers collect the publications and other literature and if they find the subject is interesting, they would get them read either by their literate children or by the school teacher, postman or other village functionaries (Hali, 1980). This brings out the significance of agricultural publications from the point of view of farmers.

The first farm magazine in agriculture was published in Paris in the year 1763 called "Agriculture De Franche", followed by "Census Agriculture" by the United States of America in Washington in 1840. The journal called "Poultry World" was published in London. By the middle of 19th century, there were many farm journals on agriculture, poultry, dairy and allied subjects from various countries. In India the first farm magazine "Krishi Sudhar" was published from Agra in 1914 in Hindi. Since then the number of farm magazines increased manifold in Hindi as well as in vernacular languages due to the sustained efforts of Government and private sectors. Some of the most popular farm magazines in India are "Indian Farmer Digest" in English (1968), "Kisan Bharati" in Hindi (1969), "Kheti" (1948) by ICAR, "Shetkari" in, Marathi (1964) "Basundhara" (1946) and "Krishik Jagatt" (1946) from West Bengal. At the time of independence in India there were hardly 20 farm magazines, now there are 112 monthly, fortnightly and weekly agricultural farm magazines published in English and other local languages. "Kurukshetra" and "Yojana" are magazines published by the Government of India on rural aspects. The State Agricultural Universities are publishing their own farm magazines; ICAR is publishing Indian Farming and Indian Horticulture; Ministry of Agriculture, Government of India publishes "Intensive Agriculture" and "Unnat Krishi". Apart from this, Food Corporation of India, Bharatiya Agro Industries Foundation, National Seed Corporation and Family Planning Association of India are also publishing farm magazines.

Now a days, with increase in literacy percentage, there is lot of scope to use farm magazines for dissemination of farm information, if the information are communicated in time, well-illustrated with pictures and photographs to the farming community. Further government is also encouraging publications of farm magazines.

The discussion of the ICT initiatives for dissemination of agricultural information to farmers at the national level is followed by the initiatives which are specific to the farmers of Kerala.

4.1.4 ICT initiatives in agriculture in Kerala

ICT in agriculture in Kerala is focused on enhancing agricultural and rural development. It involves using ICT in an innovative way in rural area by providing need based information accurately. Some of the sources of agricultural information available to farmers in Kerala are part of the national initiative, while some are specific for Kerala alone. This section details the information sources applicable to Kerala alone, while those that are part of the national network or initiative are just mentioned.

4.1.4.1 Newspaper and agriculture information

It was in the post-independence period that newspapers started recognising the value and importance of farm information and extension services to the farmers in Kerala. Even though in the beginning not much space was allotted to agriculture, the newspapers in Malayalam started declaring agricultural progress as one of their important objectives. Mathrubhumi was the first to enter the field. In the weekend edition of the Mathrubhumi daily, a new column entitled 'Krishiyum Krishikkaranum' (Farming and the Farmer) was started in 1962. The column was intended to clear the doubts and answer the queries raised by the farmers. At the same time, two articles on agricultural topics relevant at the time were also published each month on the editorial page of the newspaper. The first farm feature 'Karshika Rangam' appeared in the Mathrubhumi dated August 6, 1975.

In September 1975, Malayala Manorama started publication of weekly Karshika Rangam feature. Later Deepika, Kerala Bhushanam and Veekshanam dailies also began to publish special pages for agriculture. Besides these, almost all other newspapers in Malayalam such as Kerala Kaumadi, Desabhimani, Madhyamam, Mangalam, Kerala Times and Janmabhumi, started weekly agricultural pages and are being issued regularly. The biggest contribution to the farm pages of newspapers is from the Farm Information Bureau (FIB). The media are also not

interested in filling their pages with the same stereotype material supplied by the same agency. Besides utilising the services of universities, research organisations and scientists, they themselves prepare attractive features on interesting topics and thus ensure the individuality and attractiveness to the farm pages of their publications.

4.1.4.2 Farm magazines for agriculture information

The first magazine which started publication of scientific articles in Malayalam was Paschimodayam in 1847 covering topics such as farming, insects, weather, geography etc. The widely circulated farm magazines in Malayalam are Kerala Karshakan (FIB), Karshakasree (Malayala Manorma), Karshakan (Deepika), Rubber (Rubber Board), Indian Nalikera Journal (Coconut Development Board), Spice India (Spices Board), Kannimannu (Kerala State Agricultural Officers Association) and Vasudha (Rajan Eramallikkara). The Central Coconut Committee publication Nalikera Bulletin was changed to Indian Nalikera Journal and Cardamom Board's Elam became Spice India. The Mathrubhumi daily is publishing its annual farm issue known as Mathrubhumi Karshika Varshikapathippu regularly.

4.1.4.3 Agriculture information through radio

In Kerala, Community Radio (CR) sets are not at all popular. Though people in Kerala are not interested in attending programs through CR sets, individual listening to radio programs is very popular. The most popular agricultural programme in the radio are 'Vayalum Veedum" (Farm and Home) Programme and Krishi Padam (Farm School) broadcasted by All India Radio. A 'Farm and Home unit' was started in 1974 at the Kozhikode Station of AIR. The Radio stations in Kerala have been conducting quiz competitions for the listeners of 'Krishi Padam', and the winners in such competitions are being given awards at the fairs organised in connection with the Farm and Home programme. Necessary modifications are being made in the nature, form and content of the Farm School Programme according to the changing trends. The lessons are being prepared with the help and support of many

organisations. The Farm School is broadcasted on Saturdays and Sundays at 7.05 am. The Farm and Home programme is broadcasted at 7.05 a.m. and 6.50 pm on all days except Saturday and Sunday mornings. The Programmes are broadcasted by all the AIR Stations in the State except Metro and Frequency Modulations (FM) stations.

4.1.4.4 Television for agriculture information dissemination

In the mode of Krishi Darshan at the national level, the lone Doordarshan Kendra in Kerala is telecasting 'Nattinpuram' programme, which is telecast every day other than Saturday and Sunday at 5.30 pm. The Programme, which spotlights the villages of Kerala, is not giving much importance to agriculture as is being done by Krishidarshan. Cottage industries, artisans, cookery, co-operatives, ecological issues and many other subjects are competing with agriculture to have a suitable slot in the mini screen. Other popular programmes on the television include Krishideepam (Asianet), Harithabharatham (Amritha), Harithakeralam (Jeevan), Bhoomi Malayalam (Surya), and Mannu (Reporter).

4.1.4.5 Telephone - based agriculture information

Telephone has become one of the most common household items today. In Kerala, agricultural extension system uses telephone in disseminating information through Kisan Call Centres, SMS-based extension services, and IFFCO Kisan Sanchar Ltd. Kisan Call Centre is part of the national initiative which can be accessed by farmers in Kerala also. The SMS – based extension services are provided by the extension department of Kerala Agricultural University, Krishi Bhavans and through Karshaka Information Systems Services And Networking (KISSAN) – Kerala, which is a multi – modal agricultural information system discussed in this section itself under the IT enabled agricultural initiatives in Kerala. IKSL which is also a national – level initiative has started an Agri Market Intelligence helpline at Agricultural Market Intelligence Centre (AMIC) functioning in Kerala Agricultural University. The pepper, cardamom, and coconut farmers can avail the services of

AMIC helpline by calling at 812962879. The service is provided absolutely free of cost to the farmers irrespective of the connection they are using. All the subscribers of Green SIM card of IKSL enjoy the market intelligence updates from AMIC about the crops such as pepper, cardamom and coconut in addition to the benefits of free voice calls on farming techniques, weather forecasts, dairy farming, animal husbandry, rural health initiatives, fertiliser availability, market prices of agricultural produces etc. on a daily basis in Malayalam and other services available from IKSL.

4.1.4.6 Information Technology enabled agricultural initiatives

Apart from all other ICT tools, Government of Kerala has adopted information technology for delivering information and services to all farmers in Kerala. Advantages of adopting IT are that it helps to deliver the right information to the right person at the right time and at the right context. Two major initiatives of the Department of Agriculture, Government of Kerala which provide such services to farmers are Karshaka Information Systems Services And Networking- Kerala (KISSAN - Kerala) and e-Krishi. Besides these, Kerala Agricultural University is also having an agri – infotech portal for the benefit of farmers as well as for all those who are providing services to farmers.

(a) Karshaka Information Systems Services And Networking - Kerala

KISSAN - Kerala is an integrated, multi-modal delivery of agricultural information system, which provides several dynamic and useful information and advisory services for the farming community across Kerala. It is one of the leading citizen centric e-governance projects of the Department of Agriculture, Government of Kerala. The Project was conceived by Indian Institute of Information Technology and Management, Kerala for the Department of Agriculture. It was officially launched on 1st November 2003. The Project has adopted a strategy of providing right information to the right people at the right time and empowers the farmers with adequate knowledge, which helps them to take better decision. KISSAN - Kerala

solves the problem of content gaps by providing authentic agricultural information though various delivery methods like television, internet, telephone and mobile. The farmers may choose any medium to seek the relevant information. The key feature of KISSAN is the services delivery model that makes available to the experts from any agriculture related organization, any mix or all of the above modes of communications to reach timely and effective assistance to farmers anywhere in the State. KISSAN is becoming a role model for IT facilitated or e-extension services delivery in agriculture.

The core deliverables and achievement of KISSAN - Kerala is an integrated multi-component, multi-modal delivery of agriculture information services system that is accessible from anywhere, at anytime by all concerned. The major services under the Project include:

(i) Online dynamic agri advisory service

The dynamic portal based online advisory service (www.kissankerala.net) is a major achievement of the Project. The portal provides an online platform for the farmers to interact with expert scientists and agricultural extension officers in an interactive way. The portal also provides several dynamic advisory services like market information, weather and crop advisory, expert system on fertiliser recommendation etc. Through the online query management system, the experts in the Project have answered more than 15 000 queries of the farmers. Through the online fertilizer recommendation system, the farmers have generated more than 12000 fertilizer recommendations in local language, for their preferred crops (www.kissankerala.net).

(ii) KISSAN Krishideepam

KISSAN Krishideepam is a weekly television programme on agriculture in Malayalam that provides selective information dissemination of best practices,

success stories, departmental news, market analysis, cultivation methods, analysis of current issues and news on various schemes. Care has been taken to ensure that KISSAN Krishideepam is authentic and totally produced in-house by agricultural and media experts. The Project produces a weekly television programme of 30 minutes duration, and telecasts three times over the leading satellite channel - Asianet- in Kerala. The Programme reaches more than 25 lakhs regular viewers across the State and beyond. The Project has completed the production and telecast of 294 unbroken weekly episodes during the last 5.5 years.

(iii) Online agri video channel

The Project has launched the country's first online video channel in agriculture. More than 100 selected videos of telecast quality are made available through the channel . This becomes a single window access to all agriculture and allied topics for continuous learning for the farmers at free of cost.

(iv) Tele - advisory services

The Project also provides telephone based agri advisory services through a dedicated telephone number (0471-2700965) for the farmers. The farmers can ask any questions to the agricultural scientists and seek expert advice for their crops. As part of this service, the Project has developed an extensive crop database across the State to provide location - specific advisory services.

(v) SMS based agri – advisory services

The SMS based agri – advisory services enable the farmers to get location – specific information very fast and also alert services.

(b) e-Krishi

e-Krishi is a market driven agricultural initiative through IT enabled agri business centres in Kerala addressing the existing gap in agriculture information flow and transaction management. The Project which was conceived by Kerala State IT Mission (KSITM) provides a web-based platform for the small, medium and large farmers to interact with the interested buyers and various other stakeholders in the private, government, and non government sectors through Agri Business Centres. Akshaya Centres act as agribusiness centres in this Project.. The vision of the Project is to establish a connected farmers' community throughout Kerala who have access to information on market demand, prices, good agricultural practices and quality agricultural inputs supported by a technology enabled robust transaction platform that facilitates all their offline activities. The Project was piloted in Malapuram district during January 2006 to June 2009 and was funded by United Nations Development Proramme (UNDP). Now it is operational in Kasaragod, Kannur, Kozhikode and Kollam districts with the help of Department of Agriculture and Local Self Government Institutions. (www. kerala.gov.in/)

e-Krishi provides a facility for the farmers to post their queries which will be answered by experts. It also creates a platform for the farmers to interact with agriculture equipment suppliers, experts, agri-buyers, exporters and self help groups. Other stakeholders like banks, government offices, agricultural institutions and NGOs too use the platform of e-Krishi in order to enable the farmers reap the benefits of IT.

(c) Kerala Agricultural University agri - infotech portal

KAU agri - infotech portal is an ICT enabled platform for demand driven technology information and advisory services for farmers, extension personnel, researchers, students and all other stakeholders of the agri-front. It was established by Centre for E-Learning, KAU. The objective of the Centre for E-Learning (CEL) is to make local and frontier areas of farm technology available to the farmers and all other

agri-stakeholders round the year, free of cost. The portal provides provides information on agriculture, animal husbandry, fisheries, farm machinery and market intelligence.

d) Agricultural Marketing Intelligence Centre, Kerala Agricultural University

The Agricultural Market Intelligence Centre (AMIC) has started functioning in Kerala Agricultural University from 2009 onwards under the National Agricultural Innovation Project (NAIP). The efficient functioning of an agricultural market intelligence centre could play a pivotal role by providing timely information about the market conditions and realisation of remunerative prices. The information on demand patterns, price behaviour, better farming practices, handling, packaging etc. has to be brought to the attention of all market functionaries to reap the full benefits of production advantage. IFFCO Kisan Sanchar limited (IKSL) has signed a MoU with the Agricultural Market Intelligence Centre (AMIC) at the College of Horticulture, Kerala Agricultural University (KAU), Vellanikara. As per the MoU, all the Greencard mobile users get free market intelligence updates on Pepper, Cardamom and Coconut on their mobiles. from AMIC. The news is provided every month and the same is sent to the customers even before it goes to the media. Apart from this, there are free voice calls on farming techniques, weather forecasts, dairy farming, animal husbandry, rural health initiatives, fertilizer availability, market prices of agri produces etc, on a daily basis in Malayalam. A dedicated helpline, manned by experts from various fields to derive answers to specific queries related to agriculture and allied subjects is also available to the farmers

. After identifying the current ICT initiatives for dissemination of agricultural information, the next step is the discussion of the analysis as per the objectives of the study. As stated earlier, since the study is based on primary data collected from 90 farmers, their socio – economic profile and characteristic features

of their agricultural operations are presented before the discussion of the core objectives of the study.

4.2 Socio – economic profile of respondent farmers

Socio - economic profile is an indicator of the economic and social position of an individual or a group in relation to others in the society. It has a vital role in determining one's accessibility to the common resources and livelihood pattern. There are a lot of social and economic variables which collectively define socio - economic profile of the respondents. In the present study, the socio economic variables considered include age, gender, level of education, type of family, occupation, annual agricultural production, agricultural income and total family income and are depicted in Table 4.1.

Table 4.1 Socio economic profile of the farmers

Sl. No.	Variables	Marginal farmers	Small Farmers	Large farmers	Total
1	**Age level (years)**				
1.1	Less than 35	1	0	0	1 (1.1)
1.2	35-45	3	2	1	6 (6.7)
1.3	45-55	8	13	6	27 (30.0)
1.4	55-65	10	8	17	35 (38.9)
1.5	More than 65	8	7	6	21 (23.3)
1.6	**Average age (years)**	**60**	**58**	**60**	59
2	**Gender category**				
2.1	Male	29	27	29	85 (94.4)
2.2	Female	1	3	1	5 (5.6)

3	**Educational level**				
3.1	Illiterate	0	0	0	0 (0.0)
3.2	Primary	11	6	4	21 (23.3)
3.3	Secondary	16	17	17	50 (55.6)
3.4	Higher secondary	1	4	3	8 (8.9)
3.5	Graduation and above	2	3	6	11 (12.2)
4	**Type of family**				
4.1	Nuclear	27	26	26	79 (87.8)
4.2	Joint	3	4	4	11 (12.2)
5	**Occupational category**				
5.1	Government Service	2	1	0	3 (3.3)
5.2	Pensioners	1	2	5	8 (8.9)
5.3	Private Sector	1	1	1	3 (3.3)
5.4	Self Employed Agriculture	24	26	24	74 (82.2)
5.5	Self Employed Others	2	0	0	2 (2.2)
6	**Total annual agricultural production**				
6.1	Upto Rs. 100000	26	11	2	39 (43.3)
6.2	Rs.100001- Rs.150000	1	7	6	14 (15.6)
6.3	Rs.150001-Rs. 200000	2	7	7	16 (17.8)
6.4	Rs.200001-Rs.250000	1	2	9	12 (13.3)
6.5	Rs. 250001- Rs. 300000	0	2	3	5 (5.6)
6.6	More than Rs. 300000	0	1	3	4 (4.4)
6.7	**Average annual production (in Rs.)**	**53665**	**154058**	**206202**	**137975**
7	**Annual Income from agriculture (in**				

	Rs.)				
7.1	Upto 10000	8	2	2	12 (13.3)
7.2	10001-50000	13	12	8	33 (36.7)
7.3	50001-100000	3	11	7	21 (23.3)
7.4	100001-150000	4	3	8	15 (16.7)
7.5	150001-200000	2	2	4	8 (8.9)
7.6	More than 200000	0	0	1	1 (1.1)
7.7	**Average annual income from agriculture (in Rs.)**	47160	58360	87160	64227
8	**Total annual family income (in Rs.)**				
8.1	Upto 10000	4	1	2	7 (7.8)
8.2	10001-50000	7	9	3	19 (21.1)
8.3	50001-100000	6	5	2	13 (14.4)
8.4	100001-150000	2	6	8	16 (17.8)
8.5	150001-200000	3	4	4	11 (12.2)
8.6	More than 200000	8	5	11	24 (26.7)
8.7	**Average annual income (in Rs.)**	**147307**	**118766**	**208048**	**155774**

Source: Compiled from primary data
Note: Figures in parenthesis represent percentage share of each to total

Age is an important variable which determines a person's ability to accept information from relevant sources and using it most appropriately. Table 4.2 shows that more than half of the farmers have an age exceeding 55. The average age of the respondents is 59 years. There is only one farmer who belongs to the age bracket of less than 35 years. This indicates that most of the farmers belong to old age category and the youth are not interested in taking up agriculture as an attractive profession. It

can be also inferred that majority of the respondents have high experience and expertise in farming.

Gender - wise breakup of the respondents reveals that overwhelming majority (94.4%) of them are male. As seen generally in Kerala, men are dominating in the agricultural sector in the study area.

Level of education is an important variable that determines the ability of a person to understand and accept different mode of information inputs to make accurate decisions on his or her profession based on the information accepted. There is no illiterate respondent in the study area and the highest number of farmers is in the category of having secondary education. Around 21 per cent are having higher secondary and above. It shows that all the respondents have the ability to read or write and the level of education attainment is sufficient to support adoption of technology as reported by Aphunu and Atoma (2011). But it is noteworthy that only 12 per cent of the farmers are in the category of graduation and above. This implies that as in the case of youth, the more educated are reluctant to take agriculture as a profession.

In consonance with the general tendency in Kerala at present, majority of the farmers belong to nuclear family. Agriculture is the primary occupation for 82 per cent of the respondents. As far as agricultural production in monetary terms is concerned, a major portion of the farmers fall in the category of upto Rs 1, 00,000 per annum and most of them are marginal and small farmers. Annual income from agriculture for half of the respondents is upto Rs. 50,000. The highest income brackets are dominated by large farmers who have more diversified crops compared to marginal and small farmers

Analysis of annual family income reveals that respondents have other sources of income than agriculture. In this case, more than half of the respondents have income exceeding Rs. 1,50,000 per annum. The annual family income is the highest for large farmers as seen in the case of agricultural income. Only less than eight per cent of the respondents are having an annual income of less than Rs 10,000. It has been observed during the survey that a good number of respondent farmers are financially sound enough to access modern ICT tools.

In the present study, the location of the respondents was collected using Global Positioning System (GPS). The latitude and longitude of location of each respondent were collected using GPS receiver at an acceptable accuracy requirement of ±5m. As a part of adopting an innovative tool for plotting the location of the respondents, Geographic Information System (GIS) was used. Location of the selected respondents was plotted in a map using GIS and is depicted in Figure 4.3.

Fig. 4.3 Location of the households of respondents plotted using GIS

As already stated and evident from Fig. 4.3, the study area consists of Pananchery, Mattathur and Varantharappilly Panchayats of Thrissur district. 30 farmers have been selected from each of these panchayats. The residences of the respondents are plotted in red.

4.3 Distinctive features of agricultural operations of respondent farmers

After analysing the socio - economic characteristics of the respondents, an attempt is made to understand the distinctive features of agricultural operations of the respondents which would facilitate in the analysis of the information needs of farmers with respect to marketing and credit and their utilisation of ICT for getting this information. Hence in this section, extent of utilisation of land of respondent farmers, cropping pattern of farmers, their access to agricultural credit and backward and forward linkage are analysed. Since the farmers have been categorised into marginal, small and large farmers based on their landholdings, and data collected accordingly, the analysis has also been done and Tables presented based on this classification.

4.3.1 Extent of land utilisation of respondent farmers

Land is one of the important resources in agriculture. It is a limited, non-renewable resource and hence should not be wasted. Proper and efficient use of land is essential for sustainable agricultural production and economic development. The extent of land utilisation of the respondent farmers for cultivation in the study area is depicted in Table 4.2.

Table 4.2 Land utilisation of respondent farmers

Sl. No	Category of farmers	Fully utilised (100%)	Not fully utilised (Less than 100%)	Total
1	Marginal farmers	29 (96.7)	1(3.3)	30(100)
2	Small farmers	28 (93.4)	2(6.6)	30(100)
3	Large farmers	28(93.4)	2(6.6)	30(100)
4	Total	85(94.4)	5(5.6)	90(100)

Source: Compiled from primary data
Note: Figures in parenthesis represent percentage share of each to total

Out of the total farmers more than 94 percent of the farmers are fully utilising their land for agricultural purposes. Only one among the marginal farmers is not utilising the land fully for farming. It is to be noted here that there is a deviation from the general tendency seen among farmers in Kerala to leave the land without cultivating due to reasons like low profitability and scarcity of labour for agricultural operations. It was observed that even the paddy fields of the respondent farmers are under cultivation.

4.3.2 Cropping pattern of the respondents

Cropping pattern is an important component of any farming system, which is the proportion of the area under various crops at a particular point of time in the total landholdings of a farmer. The choice of farmers about the cultivation of a crop depends on many factors such as rainfall, costs of production, commodity price, income from farming, diseases and pest management, crop rotation considerations, availability of information on agricultural practices etc. The cropping pattern of the respondents of the study area is given in Table 4.3.

Table 4.3 Cropping pattern of respondent farmers

Sl. No	Category of farmers	Crops/No. of farmers					
		Banana	Coconut	Rubber	Paddy	Nutmeg	Arecanut
1	Marginal farmers	5	12	7	20	1	1
		(21.74)	(24)	(31.82)	(35.09)	(14.29)	(1.1)
2	Small farmers	8	17	5	19	4	0
		(34.78)	(34)	(22.73)	(33.33)	(57.14)	(0)
3	Large farmers	10	21	10	18	2	0
		(43.48)	(42)	(45.45)	(31.58)	(28.57)	(0)
4	Total	23	50	22	57	7	1
		[25.56]	[55.56]	[24.44]	[63.33]	[7.78]	[1.1]
		(100)	(100)	(100)	(100)	(100)	(100)

Source: Compiled from primary data
Note 1: Figures in simple bracket represent percentage share of each to total of that crop
Note 2: Figures in square bracket represent percentage share of each to total farmers

The major crops cultivated by the farmers in the order of priority in the study area include paddy, coconut, banana, rubber, nutmeg and arecanut. More than 63 per cent of the farmers are cultivating paddy. All the farmers are cultivating a minimum of two crops. Major cultivators of banana, coconut, and rubber are large farmers whereas paddy and intercrops such as nutmeg and arecanut are cultivated mainly by small and marginal farmers. Top most priority is for paddy for marginal farmers, whereas it is rubber for large farmers.

4.3.3 Share of agricultural income to total family income

The proportion of agricultural income to total income illustrates the significance of agriculture to the family. Agricultural income is expressed as a per cent of the total family income and is presented in Table 4.4. Total family income includes income from physical assets like rent, other occupational income of family members, income from financial assets, and income from subsidiary activities in addition to agricultural income.

Table 4.4 Share of agricultural income to total family income

Sl. No	Category of farmers	Below 25%	26-50%	51-75%	76-100%	Total
1	Marginal farmers	10	5	3	12	30
2	Small farmers	7	6	5	12	30
3	Large farmers	6	7	5	12	30
4	Total	23(25.6)	18(20)	13(14.4)	36(40)	90(100)

Source: Compiled from primary data
Note: Figures in parenthesis represent percentage share of each to total

It is clear from Table 4.4 that for 54 per cent of the farmers, agricultural income constitutes more than half of their total family income. It is noteworthy that irrespective of the category of farmers, 40 per cent of them derive more than 75 per cent of their total income from agriculture. One – third of the marginal farmers derive only less than 25 per cent of their total income from agriculture.

4.3.4 Sources of agricultural credit availed by farmers

Agricultural credit is one of the important interventions to solve rural poverty, and plays an important role in agricultural development. Expanding the availability of agricultural credit has been widely used as a policy to accelerate agricultural and rural development. The emphasis of these policies has been on progressive institutionalisation for providing timely and adequate credit support to all farmers

with particular focus on small and marginal farmers and weaker sections of society to enable them to adopt modern technology and improved agricultural practices leading to increased agricultural production and productivity. Table 4.5 depicts the sources from which the respondent farmers have availed agricultural credit. Only institutional agencies are depicted in Table 4.5 since none of the respondents have relied on non – institutional agencies.

Table 4.5 Source of agricultural credit availed by farmers

Sl. No	Category of farmers	No access	Have access (No. of farmers)							Grand total
			Public sector banks	Private sector banks	PACS	RRBs	Money lenders	NBFC	Total	
1	Marginal farmers	12 [31.6] (40)	9	0	8	0	0	1	18 [34.6] (60)	30
2	Small farmers	15 [39.4] (50)	6	0	6	3	0	0	15 [28.9] (50)	30
3	Large farmers	11 [28.9] (37)	8	0	11	0	0	0	19 [36.5] (63)	30
4	Total	38(42.2)	23(44.2)	0(0)	25(48.1)	3(5.8)	0(0)	1(1.9)	52(57.8)	90

Source: Compiled from primary data

Note: (i) Figures in simple bracket represent percentage share of each to total
(ii) Figures in square bracket represent percentage share of each to category total
(iii) Figures in bold bracket represent percentage share of each to farmer category total

It is observed from Table 4.5 that 42 per cent of the farmers have not taken any agricultural loans, neither from institutional or non-institutional sources. Non-institutional sources like money lenders are completely avoided by the respondent farmers. Out of those who have availed agricultural credit, only one farmer, who is a female has taken from a Non-Banking Financial Company (NBFC). Primary Agricultural Credit Societies (PACS) are the most favourite source of credit from which more than 48 per cent of the farmers have availed loans. The personal relationship of the farmers with the PACS is the primary reason for preferring this agency. Those who have not availed agricultural credit are of the opinion that credit is not helpful for improving their farm operations and many of them are averse to indebtedness. None of the respondents have availed loans from private sector banks as they consider them unapproachable and their interest rate unaffordable. Moreover the Interest Subvention Scheme for farmers who make prompt repayment became applicable to private banks only from the year 2013-14. On the other hand, the motivating factor for approaching public sector banks is their Interest Subvention Scheme which have been operation since 2006 – 07.

Location of those financial institutions from whom respondents have availed loans are identified in the three panchayats, viz., Pananchery, Mattathur and Varantharappilly using GPS receiver and are plotted in a map using GIS and are depicted in Figures 4.4 and 4.5.

Fig. 4.4 Location of the sources of agricultural credit of respondents: Pananchery Panchayat

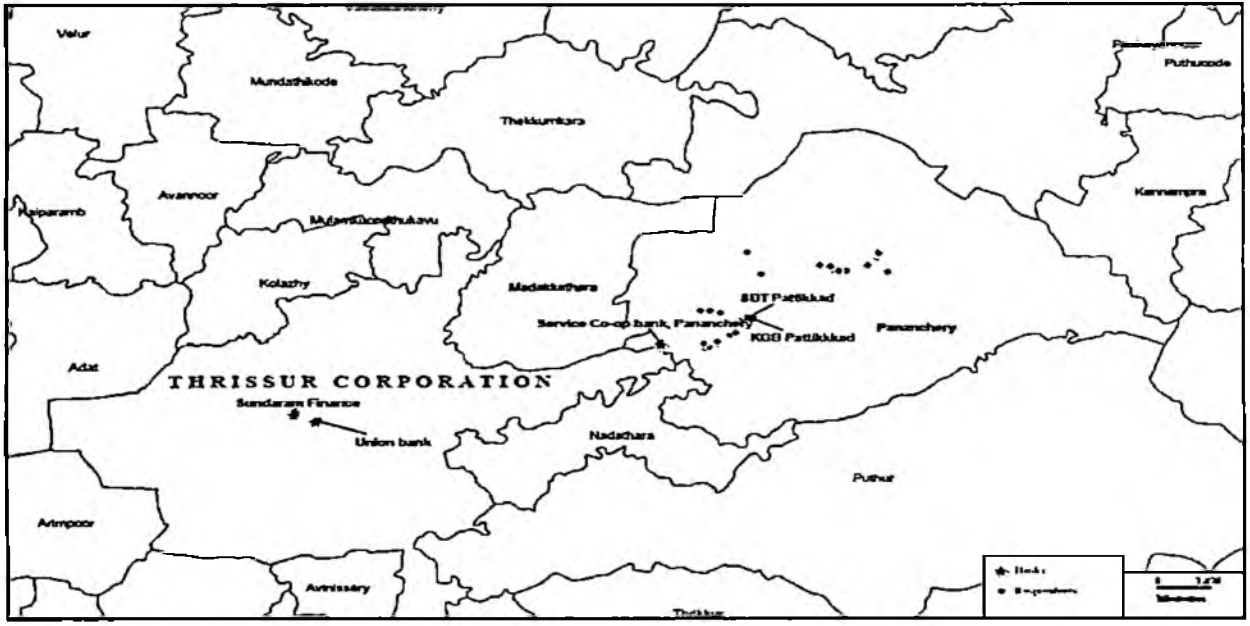
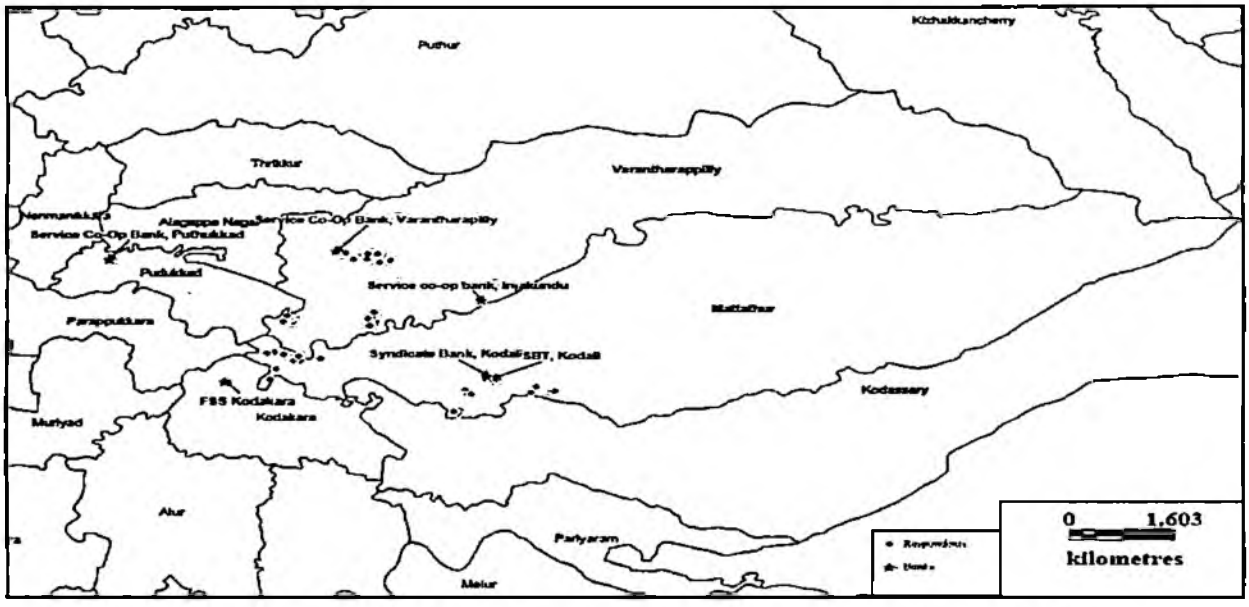


Fig. 4.5 Location of sources of agricultural credit: Mattathur and Varantharappilly Panchayats



Figures 4.4 and 4.5 reveal the preference of the respondents to PACS, especially in the Varantharappilly and Mattathur Panchayats. In Varantharappilly Panchayat loans are availed only from Service Co-operative Banks, even though branches of commercial banks are existing there.

4.3.5 Extent of agricultural credit availed by farmers: Source - wise

Once the sources of agricultural credit of respondent farmers are identified, the next attempt is to examine the extent of credit availed by them from these sources. It is already seen that out of the 90 respondent farmers, only 52 have availed agricultural credit (Table 4.5). The extent of credit availed by these 52 farmers from the four sources, viz., public sector banks, PACS, Kerala Grameen Bank and NBFC are depicted in Table 4.6.

Table 4.6 Agricultural credit availed by farmers: Source - wise

Sl. No.	Category	Public sector banks	PACS	RRB	NBFC	Total
1	Upto Rs.50000	9(39.1)	9(36)	2(66.7)	1(100)	21(40.4)
2	Rs. 50001-Rs.100000	3(13.0)	7(28)	0	0	10(19.2)
3	Rs. 100001-Rs. 250000	5(21.7)	6(24)	0	0	11(21.2)
4	Rs. 250001-Rs. 500000	6 (26.1)	3(12)	0	0	9(17.3)
5	Above Rs. 500000	0	0	1(33.3)	0	1(1.9)
6	Total	23[44.2]	25[48.1]	3[5.8]	1[1.9]	52[100]
7	Average credit (Rs.)	144348	109577	226667	50000	76878

Source: Compiled from primary data

Note: (i) Figures in simple brackets represent percentage share of each to column total

(ii) Figures in square brackets represent percentage share of each to row total

The category of upto Rs 50,000 amount of loan is having the highest number of respondents. This is because, farmers are eligible for loans upto Rs 50,000 on submission of latest land tax receipt without any other security. RRB is having the highest average loan amount since there is one small farmer who has borrowed more than Rs. 5 lakhs. Otherwise public sector banks have the highest average credit. Even though PACS have the highest number of borrowers, the number of farmers in the larger income group is less compared to public sector banks and hence average credit per borrower is lower than that of public sector banks. The main types of loans are Kisan Credit Card (KCC) limit and agricultural gold loan upto Rs 1 lakh at four per cent interest under interest subvention scheme, agricultural gold loans exceeding Rs 1 lakh and upto Rs 3 lakhs at interest rate of 12 to 14 per cent and agricultural loans under Differential Rate of Interest (DRI) loans at four per cent interest rate.

4.3.6 Extent of agricultural credit availed by farmers: Farmer category - wise

This section is devoted for analysing the extent of agricultural credit based on the category of farmers. Since the amount of loan depends on the scale of finance and the acreage under cultivation, large farmers are eligible for higher amounts compared

to marginal and small farmers. Details of loans availed by each category of farmers are presented in Table 4.7.

Table 4.7 Agricultural credit availed by farmers: Farmer category- wise

Sl. No.	Category	Marginal farmers	Small farmers	Large farmers	Total
1	Up to Rs.50000	12 (66.7)	5 (33.3)	4(21.1)	21(40.4)
2	Rs. 50001-Rs.100000	3(16.7)	4(26.7)	3(15.8)	10(19.2)
3	Rs. 100001-Rs. 250000	3(16.7)	2(13.3)	6(31.6)	11(21.2)
4	Rs. 250001-Rs. 500000	0	3(20)	6(31.6)	9 (17.3)
5	Above Rs. 500000	0	1(6.7)	0	1(1.9)
6	Total	18[34.6]	15[28.9]	19 [36.5]	52 [100]
7	Average credit (Rs.)	39166	81467	110000	76878

Source: Compiled from primary data

Note: (i) Figures in simple brackets represent percentage share of each to column total
(ii) Figures in square brackets represent percentage share of each to row total

Two – third of the marginal farmers fall in the category of loans upto Rs 50,000, which can be substantiated due to two reasons. Firstly, as already stated, (Table 4.6), it is easy to avail since no security other than the latest land tax receipt need be given for obtaining the loan. Secondly, since the landholdings are less than one ha, the amount of eligible loan based on scale of finance will be low. No marginal farmer has availed loans exceeding Rs 2, 50,000. Out of 19 large famers, 12, constituting 63 per cent have availed loans between Rs 1 lakh and Rs 5 lakh. Compared to their eligibility, large farmers have availed lesser amount of credit. It is already seen that 11 out of 30 large farmers are in the highest family income category of more than Rs 2 lakh. (Table 4.1). During the survey many of the large farmers have opined that they are not in need of loans. Hence large farmers have availed lesser amount of loans than their eligible amount of loan.

4.3.7 Backward and forward linkages in marketing

Backward and forward linkages in marketing have a great impact on the income of farmers. Backward linkages discussed here consist of sources from which inputs are purchased and forward linkages include the channels through which produce are sold by the farmers. Generally farmers have specific reasons for their choice of sources of input purchases and the marketing channel. The preference of the farmers to the various sources of input supplies such as seed, fertiliser, equipment and pesticides are presented in Table 4.8. Since the same farmer may be depending on different sources, for input supplies, the total column exceeds the total number of farmers.

Table 4.8 Choice of sources of input supplies by farmers

Sl. No.	Input sources	Marginal farmers	Small farmers	Large farmers	Total
1	Krishi Bhavan	22	25	23	70(77.8)
2	Co-operative society	7	7	8	22(24.4)
3	Private Dealers	7	11	15	33(36.7)

Source: Compiled from primary data
Note: Figures in parenthesis represent percentage share of each total to total number of respondents

Krishi Bhavan is the first choice of farmers irrespective of the category to which they belong. Farmers are getting inputs like fertilisers, seeds and equipment at different subsidy rates from Krishi Bhavan under different schemes based on criteria such as size of landholdings, number of crops etc. The paddy farmers mostly depend on Krishi Bhavan for seed and fertiliser. The subsidised input supplies reduce their cost of cultivation. Second preferred source for purchasing input is private dealers which are mostly accessed by large farmers. The co-operatives are the least preferred by farmers since no subsidy is available from them and the farmers have to procure at the market price.

The marketing channels of the farmers, which is forming part of the forward linkages consist of private traders, co-operative societies, SUPPLYCO, open market, farmers' markets like Farmers' Clubs and Vegetable and Fruit Promotion Council Keralam (VFPCK), and Krishi Bhavan. The choice of the farmers to these channels are shown in Table 4.9.

Table 4.9 Choice of marketing channels for output by farmers

Sl. No.	Output sources	Marginal farmers	Small farmers	Large farmers	Total
1	Open market	5	7	0	12(13.3)
2	Private Traders	12	17	17	46(51.1)
3	Co-operative societies	1	0	1	2(2.2)
4	SUPPLYCO	11	16	17	44(48.9)
5	Farmers' market	1	4	5	10(11.1)
6	Krishi Bhavan	1	4	10	15(16.7)

Source: Compiled from primary data

Note: Figures in parenthesis represent percentage share of each total to total number of respondents

As evident from Table 4.9, private traders are preferred by all categories of farmers, with more than 50 per cent of the respondents depending on this channel for marketing their produce. Even at lesser price compared to other sources, this channel is preferred by farmers since they get the price on spot and they will collect the produce at the doorstep of the farmer. The second preferred channel is SUPPLYCO with nearly 49 per cent of the respondents using this channel. SUPPLYCO is the marketing channel of the rice producers. Even though there is delay in the realisation of cash, farmers depend on SUPPLYCO since it ensures reasonable and stable price for paddy. Krishi Bhavan is the marketing channel for coconut. It is not favoured by farmers since they have to take their produce to Krishi Bhavan involving transportation costs. According to the farmers, farmers' market is actually a traders' market. Mostly perishable products like, banana and vegetables are dealt in the

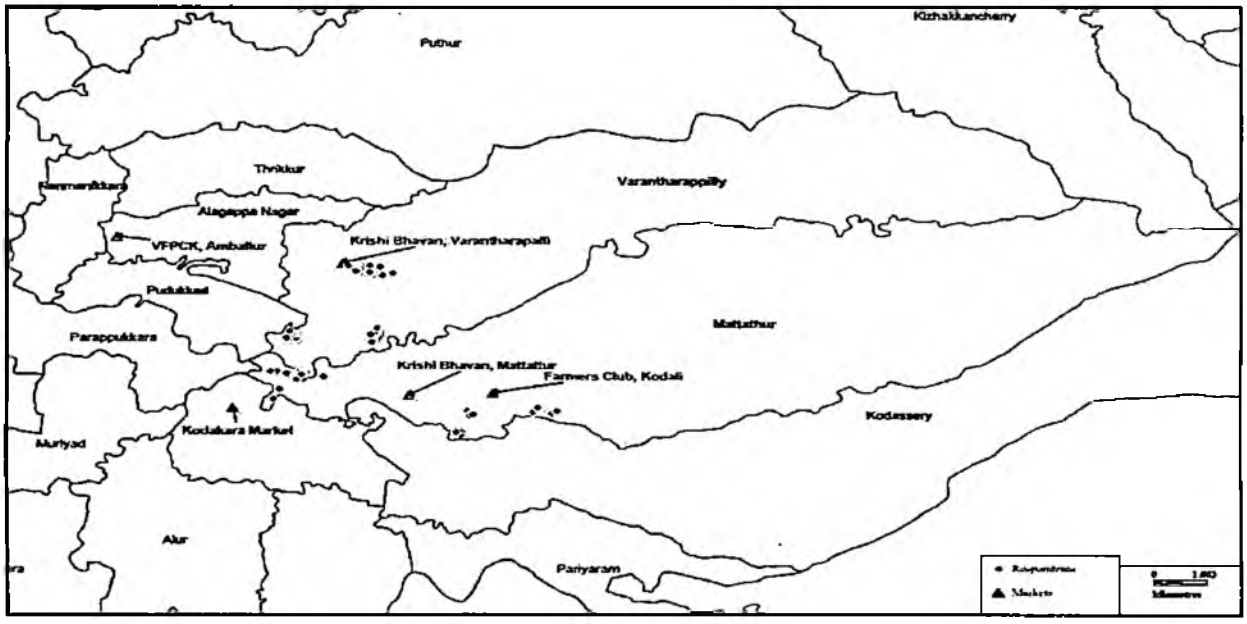
farmers' market and hence farmers have no bargaining power and have to oblige to the prices decided by the traders leading to distress sales. After deducting the commission of the market, from the already low prices offered, the returns are not remunerative according to the farmers. Hence farmers supply to this market only due to urgency of sale arising from the perishability nature of the produce.

The least preferred marketing channel is the co-operative societies. This is inspite of the fact that co-operatives are the most preferred agency for obtaining credit by the farmers in the study area (Table 4.5). If the output is supplied to the co-operative societies by the farmers, their credit will be linked with marketing. Hence the farmers will get only the balance amount after deducting the loan amount which has become due. Therefore the farmers are not interested to supply their produce to co-operative societies.

The location of the marketing channels of the respondents discussed above in the study area are plotted in a map using GIS and is depicted in Figures. 4.6 and 4.7.

Fig. 4.6 Market location of the respondents in Pananchery Panchayat

Fig 4.7 Market location of the respondents in Mattatur and Varantharapilly Panchayats



As evident from Fig. 4.6 and 4.7, SUPPLYCO, open markets, namely, Sakthan Market and Kodakara Market, and farmers' market VFPCK are outside the area of the Panchayats. Since the private traders have their place of business in distant areas, and since they come to the doorsteps of the farmers, they are not plotted.

4.4 Overall agriculture information needs, awareness, access and gap: Farmers' perspective

Lack of agricultural information has been identified as the most powerful deterrent to the farmers in the whole gamut of agricultural system. In the changing scenario, agriculture is becoming information oriented and access to accurate and adequate information is very essential for increasing agricultural production and productivity. In farm management, the decisions are guided by information. Farmers

are therefore engaged in information search in order to fill the information gap and to satisfy their goals. Keeping this in mind, an attempt is made here to understand farmer's perspective about agricultural information needs in general, before analysing the specific information needs of farmers with respect to marketing and credit.

Agricultural information refers to all published and unpublished knowledge on general aspects of agriculture and consists of innovations, ideas, and technological practices (Aina, 1990). Such information needs include information on recommended practices, soil conservation, prevention of plants and animal disease, fertiliser application, farm machineries, proper storage of farm products, marketing techniques etc. In this section first the overall agricultural information needs of the farmers are identified and presented, followed by the analysis of the awareness, access and gap in each of these agricultural information identified.

4.4.1 Overall agriculture information needs of farmers

The overall agriculture information needs of the farmers are identified and classified into information regarding production, post-harvest techniques, market/ marketing, credit, agricultural insurance, government schemes and labour. Information need index is developed to rank these needs. For the construction of information need index, the respondents were asked to rate their information needs with respect to general agricultural information on a five point scale. Based on the information need index, information needs are ranked and is shown in Table 4.10.

Table 4.10 Overall agriculture information needs of farmers: Farmer category - wise

Sl No	Information needs	Information need index				Rank
		Marginal farmers	Small farmers	Large farmers	Total	
1	Production information	58.7	62	61.3	61.6	6
2	Post - Harvest techniques	40	42.0	44	42	7
3	Market/ Marketing	87.3	98.7	100	96	2
4	Credit information	77.3	90.6	80.0	82.7	4
5	Agricultural insurance	83.3	94.7	97.3	94.4	3
6	Government schemes	95.3	93.3	100	97.3	1
7	Labour information	65.3	66.7	70.7	65.3	5

Source: Compiled from primary data

It is clear from Table 4.10 that the most needed agriculture information is about government schemes followed by market information. This is contrary to the finding of Bachhav (2012) who reported that most of the farmers need market information followed by information on government schemes. But the large farmers have given equal weight to information need on government schemes and market since both these information have direct impact on the profitability of the farming operations. Most of the respondents are unaware of various government schemes implemented for them. Only farmer leaders have knowledge about the schemes in operation in the study area for farmers. Farmers are getting inputs like fertilisers, seeds and equipment at different subsidy rates from Krishi Bhavan based on different criteria such as size of landholdings and number of crops under Rashtriya Krishi Vikas Yojna (RKVY) and Sustainable Development of Rice (SDR). Production bonus is also availed by the paddy farmers in cash. Other than this, they need information on new central and state sponsored schemes implemented for farmers. To build awareness, farmers have suggested awareness programmes and seminars about government schemes through Krishi Bhavan.

At the same time, farmers highly need market information on daily basis, since market price and demand for the produce are changing every day. Presently, majority of the farmers are availing market information through newspaper, television and from fellow farmers. Farmers' market is another important source of market information to most of the marginal and small farmers. The Market Information System run by the VFPCK and farmers' club provide price information to the farmers only on the market day, when they reach the market. Once they come to the market with the produce, the farmers have no bargaining power over price, and they are forced to make distress sales.

Post – harvest techniques have the least information need index. The farmers have traditional knowledge of post-harvest techniques, especially about paddy and rubber. They have knowledge about the level of moisture content of paddy and the different grades of rubber. They utilise the storage facility of SUPPLYCO for paddy and that of Krishi Bhavan for coconut.

Along with prioritising the agricultural information needs of the farmers, it is important to know the present state of affairs of the farmers regarding awareness about the identified agricultural information needs, their access to these information, and the existence of information gap.

4.4.2 Awareness, access and gap in overall information on agriculture

Farmers' information requirements vary with the stages of production in agriculture. In general, all farmers seek to acquire complete, high quality and timely information to make decisions related to risk, throughout the year. Farmers can reduce the probability and magnitude of losses due to risk and uncertainty, if they are able to access relevant and timely information.

Awareness with respect to information on agriculture refers to whether farmers have knowledge about a particular agricultural information. Access to agricultural information denotes whether the information is available for use and the farmer has approachability to the information which will add to his existing level of information about a particular aspect. Information gap is the difference between awareness and access of agricultural information by the respondent farmers.

Awareness, access and information gap with respect to the seven identified agricultural information needs (Table 4.10), viz, information regarding production, post-harvest techniques, market/ marketing, credit, agricultural insurance, government schemes and labour are presented in the ensuing sub sections.

4.4.2.1 Awareness, access and gap in production information

Production information consist of information on various agricultural inputs such as improved variety of seeds, pesticides, fertiliser application, agricultural equipment, recommended practices such as seed treatment, soil fertility, irrigation, pest and disease management, weather conditions, planting methods, harvest technology etc. The awareness, access and gap regarding production information are depicted in Table 4.11.

Table 4.11 Awareness, access and gap in production information – Farmer category - wise

Sl. No.	Type of Farmer	Awareness	Access	Information Gap
1	Marginal Farmer	30(100)	30(100)	Nil
2	Small Farmer	30(100)	30(100)	Nil
3	Large Farmer	30(100)	30(100)	Nil
4	**All Farmers**	90(100)	90(100)	Nil

Source: Compiled from primary data
Note: Figures in parenthesis represent percentage share of each to category total

From Table 4.11 it can be observed that cent percent of the farmers are aware of and have access to production information. Hence there is no information gap with respect to production information. They have common knowledge about package of practices of various crops. They have access to Krishi Bhavan, fellow farmers, friends, relatives and Secretary of Padasekharam for production information. A study by Achugbue and Anie (2011) has also reported that majority of the farmers rely on their community leader, friends and relatives for acquisition of production information, which supports the findings of this study. Among the various information needs regarding production information, the most important one pointed out by farmers are information on pest and disease management. Although there is no gap with respect to production information, some of the female farmers remarked that information regarding benefits like inputs and subsidy through Krishi Bhavan are not disseminated to them at the right time.

4.4.2.2 Awareness, access and gap in information on post harvest techniques

Post harvest handling is the stage of crop production immediately following harvest, including curing, operations prior to packaging such as cleaning, grading and sorting, packaging, storing and protection from pests. Post harvest treatment largely determines the final quality, whether a crop is sold for final consumption or used as an ingredient in processed food product, protects food safety, and reduces losses between harvest and consumption. The shelf life of the produce depends on the post-harvest techniques adopted by the farmers. When a crop is ready for harvest, farmers need information on the various post harvest techniques that can be adopted. In the study area except for tree fruits such as coconut and arecunut, all other crop produces need post harvest care. The information awareness, access and information gap regarding post harvest techniques of the respondent farmers are presented in Table 4.12.

Table 4.12 Awareness, access and gap in information on post harvest techniques

Sl. No.	Type of Farmer	Awareness	Access	Information Gap
1	Marginal Farmer	30 (100)	22 (73.3)	8 [26.7]
2	Small Farmer	30 (100)	29 (96.7)	1[3.3]
3	Large Farmer	30 (100)	30 (100)	0[0]
4	**All Farmers**	90 (100)	81 (90)	9[10]
Chi-Square: Asymp. Sig. 0.001*				

*Significant at 1%
Source: Compiled from primary data
Note: (i) Figures in simple bracket represent percentage share of each to category total
(ii)Figures in square bracket represent percentage share of gap to awareness

All the farmers are aware about post harvest techniques as evident from Table 4.12, and majority of them (90%) have access to information on post-harvest techniques. Farmers have traditional knowledge about the techniques of post-harvest care to be adopted for their crop produce. Besides this, they seek information from farmer leaders, fellow farmers and relatives for further details and clarification. Paddy farmers have to ensure a particular level of moisture content for their paddy to be eligible for supply to SUPPLYCO. They are getting such information from the Secretary of their Padasekharam. Rubber cultivators have to make rubber sheets at specified grades and weights prescribed by Rubber Board, the information on which are obtained from newspapers and co-operative societies. Farmers who are cultivating coconut and arecunut are not accessing any source of post-harvest information. Information gap is more in the case of marginal farmers (26.7%) since compared to other category of farmers, they have less number of crops and one arecanut farmer is a marginal farmer (Table 4.3). It is noteworthy that large farmers are fully aware and they fully access information regarding post – harvest techniques. Chi-Square test is

found to be significant at one percent level which implies that access to post harvest technique is significantly related to category of farmers.

4.4.2.3 Awareness, access and gap in market information

Market information in a narrow sense refers to price information. In a broad sense it includes information on prevailing market price, comparative prices in different markets, historical price data, procurement prices fixed by the government and the effective way to use these price information to make farming operations profitable and competitive. As already found farmers are in need of market information on daily basis (Table 4.10). The awareness, access and information gap regarding market information is illustrated in Table 4.13.

Table 4.13 Awareness, access and gap in market information: Farmer category – wise

Sl. No.	Type of Farmer	Aware	Access	Information Gap
1	Marginal Farmer	30(100)	30(100)	Nil
2	Small Farmer	30(100)	30(100)	Nil
3	Large Farmer	30(100)	30(100)	Nil
4	**All Farmers**	90(100)	90(100)	Nil

Source: Compiled from primary data

Note: Figures in parenthesis represent percentage share of each to category total

Market information is one of the most important information needs of farmers (Table 4.10). It is evident from Table 4.13 that cent percent of the farmers are aware of and have access to marketing information. Hence no information gap is felt by the farmers with respect to market information. For most of the respondents market information means information about current market price and they are accessing newspaper for getting the same. Most of the farmers are not spending time to check the prices in different market or to collect historical data of prices of their produces.

From newspaper, they are obtaining current market price of the produce in Thrissur district and changes in procurement price fixed by government from time to time. There are farmers, especially marginal farmers, who are accessing price information from the market itself. Stability in price is the important demand of the respondent farmers and according to them it will help to increase their bargaining power and eliminate middleman from marketing channel.

4.4.2.4 Awareness, access and gap in credit information

Agricultural credit plays an important role in agricultural development. Credit is availed by the farmers from institutional and non-institutional sources and it will help them to purchase costly inputs and raise different crops. An agriculture loan encompasses all loans and advances granted by the borrowers to finance activities related to agriculture. Farmers need information about credit facilities, sources of credit, terms and conditions etc. In the present study, farmers have taken only institutional credit and 42 percent of the respondents have not availed any credit. (Table 4.5). The awareness of farmers about credit information, its access and gap are depicted in Table 4.14.

Table 4.14 Awareness, access and gap in credit information: Farmer category - wise

Sl. No.	Type of Farmer	Aware	Access	Information Gap
1	Marginal Farmer	30(100)	21(70)	9[30]
2	Small Farmer	30(100)	22(73.3)	8[26.7]
3	Large Farmer	30(100)	21(70)	9[30]
4	**All Farmers**	90(100)	64 (71.1)	26[28.8]

Source: Compiled from primary data

Note: (i) Figures in simple bracket represent percentage share of each to category total
(ii)Figures in square bracket represent percentage share of gap to awareness

Even though 42 per cent of the farmers have not availed credit, they are aware about credit facilities of institutional and non-institutional agencies and more than seventy percent of farmers have access to it. They are aware about the terms and conditions of not only institutional sources but also non institutional sources. But still they are not availing credit due to their own reasons like they do not want to be in indebtedness and that credit will not improve their present standard of living (Table 4.5). Main sources of credit information to the farmers are banks and financial institutions and fellow farmers. Farmers have direct contact in person and through mobile phones with banks especially co-operative banks and public sector banks. Loanee farmers are the major source of credit information of non - loanee farmers. Also a local channel named "moon light" is providing credit information on due date of renewal in case of Kisan Credit Card (KCC), interest rates on loans and related policy changes to the farmers every day. Information gap is obvious for credit information (28.8%), which is seen in all the categories of farmers.

4.4.2.5 Awareness, access and gap in information on agricultural insurance

Agriculture in India is highly vulnerable to risks due to natural calamities, like hurricane, droughts and floods, and attack of pests and wild animals. Destruction of crops due to the attack of wild animals is a common menace in Thrissur district. It is necessary to protect the farmers from these hazards and ensure their credit eligibility for the next season. For this purpose, the Government of India has introduced many agricultural insurance schemes throughout the country. Farmers need information on Central Government sponsored as well as State Government sponsored insurance scheme for their crops (Table 4.10). Group insurance for paddy and insurance scheme for rubber of the Rubber Board are popular in the study area. Information awareness, access and gap regarding agricultural insurance is given in Table 4.15.

Table 4.15 Awareness, access and gap in information on agricultural insurance

Sl. No.	Type of Farmer	Aware	Access	Information Gap
1	Marginal Farmer	24(80)	5(16.7)	19[79.2]
2	Small Farmer	24(80)	2(6.7)	22[96.7]
3	Large Farmer	23(76.7)	6(20)	17[73.9]
4	**All Farmers**	71(78.9)	13(14.4)	58[81.7]

Source: Compiled from primary data
Note: (i) Figures in simple bracket represent percentage share of each to category total
(ii)Figures in square brackets represent percentage share of gap to awareness

Table 4.15 shows that information gap is very high in the case of agricultural insurance with nearly 82 per cent of the people who are aware of it having no access to the information. It is noteworthy that more than 21 per cent of the farmers, including large farmers are not even aware of the agricultural insurance schemes. Information gap is the highest among small farmers where, nearly 97 per cent of the people are aware, but have no access. Eligibility conditions and coverage of crops, like insurance not available for mixed crops, are the major obstacles in accessing information.

Those farmers who are aware have knowhow about coverage of crops, eligibility conditions, and procedural formalities of agricultural insurance. Group insurance scheme for paddy is managed by the Secretary of Padasekharam. Only a few farmers are accessing information from the Secretary. Rubber Board has implemented insurance scheme for rubber farmers. In Varantharappilly panchayat, as result of fire, acres of rubber cultivation have been destroyed and the farmers got the benefits of the Scheme. Farmers are obtaining agricultural insurance information from Krishi Bhavan and Padasekharam. Large farmers who are cultivating rubber have relatively more access to agricultural insurance provided by the Rubber Board.

4.4.2.6 Awareness, access and gap in information on Government Schemes

Government of India announces a number of schemes for farmers from time to time. These schemes could be either central, state specific or a joint collaboration between the central and the states. There are several government schemes for the farmer producer group like National Horticulture Mission, Seed Production Scheme, Agricultural Technology Management Agency (ATMA), Kerala, Interest Subvention Scheme etc. As a beneficiary, farmer needs information on these schemes. Table 4.16 depicts information awareness, access and gap of the respondents regarding government schemes.

Table 4.16 Awareness, access and gap in information on Government Schemes

Sl. No.	Type of Farmer	Aware	Access	Information Gap
1	Marginal Farmer	29(96.7)	24(80)	5[17.2]
2	Small Farmer	29(96.7)	24(80)	5[17.2]
3	Large Farmer	29(96.7)	25(83.3)	4[13.8]
4	**All Farmers**	87(96.7)	73(81.1)	14[16.1]

Source: Compiled from primary data

Note: (i) Figures in simple bracket represent percentage share of each to category total
(ii) Figures in square brackets represent percentage share of gap to awareness

The awareness level about Government Schemes is very high and same for all category of farmers. But there exists information gap also for all three categories. Compared to agricultural insurance, the information gap for Government Schemes is less (16%). As already reported the most needed information is on government schemes (Table 4.10). Farmers have access to information on Interest Subvention Scheme and subsidies of banks and RKVY programme of Krishi Bhavan. Recently launched Direct Benefit Transfer Scheme of Government of India is also popular among farmers. But they do not know the exact name and details of the various schemes. Information on subsidy on inputs are accessed by the farmers from Krishi Bhavan and Secretary of Padasekharam. Nutmeg farmers reported that they do not

have any information regarding government schemes and credit facilities for nutmeg cultivation.

4.4.2.7 Awareness, access and gap in information on labour availability

Non availability of labour and increasing labour cost are the two major problems faced by farmers in Kerala. But in contrast to this, labour scarcity and increasing labour cost have not been reported as a major problem by the farmers in the study area. As such they are also not keen on obtaining information on availability of labour for agricultural operations through labour banks. Awareness, access and gap regarding information on labour is presented in Table 4.17

Table 4.17 Awareness, access and gap in information on labour availability

Sl. No.	Type of Farmer	Aware	Access	Information Gap
1	Marginal Farmer	4(13.3)	0(0)	4[100]
2	Small Farmer	5(29.4)	0(0)	5[100]
3	Large Farmer	8(26.7)	0(0)	8[100]
4	**All Farmers**	17(18.9)	0(0)	17[100]

Source: Compiled from primary data

Note: (i) Figures in simple bracket represent percentage share of each to category total
(ii) Figures in square brackets represent percentage share of gap to awareness

Table 4.17 illustrates that only a few respondents (19%) are aware about labour availability through labour banks and they have no access to any source, resulting in cent per cent information gap. Since majority of the farmers (81%) are not aware and have not accessed information on labour, it can be inferred that scarcity of labour and increasing labour cost are not a severe problem in the study area. Those farmers who are aware about labour availability are also not accessing it. It was observed during the survey that the family members of the respondent farmers are actively involved in the agricultural operations, especially in the case of marginal farmers. It is to be noted here that the gap between awareness and access is 100 per

cent in the case of information on labour availability since none of the very few aware farmer respondents have access to the information.

The most important agricultural information needs of the farmers in the study area are about government schemes related to loans and subsidies followed by market information. In agricultural operations, the information gap is zero in production and market information which indicate that these are the two important agriculture information, farmers accessing regularly. At the same time, the information gap is 100 percent for labour in which the awareness is the lowest. After information on labour, the next highest information gap is in the case of agricultural insurance, in which even though the awareness is high accessibility is low.

After understanding the overall agricultural information needs and gap of the farmers, the next discussion is about the information needs of farmers in Thrissur district with respect to marketing in detail entailing its various components.

4.5 Farmers' marketing information needs, awareness, access and gap

Farmer's market information needs are those that enable him to make rational and relevant decisions. Day to day market trend of different variety of crops is necessary for the farmers to ensure reasonable price for their produce. Marketing information needs of the farmers were identified and classified into nine categories, viz, information needs on input supply, market profile, grades and standards, market research studies, market trend, export market, improved marketing practices, warehouse facilities and futures trading. Information needs were rated using a five point scale and information index was developed for each information needs. The information needs index of marginal, small and large farmers are given in Table 4.18

Table 4.18 Marketing information needs of farmers: Farmer category - wise

Sl. No	Information needs	Information needs index				Rank	Asymp. Sig.
		Marginal farmers	Small farmers	Large farmers	Total		
1	Input supply	42.00	43.33	42.00	42.44	4	
2	Market profile	50.67	60.67	51.33	54.22	2	
3	Grades and standards	45.33	56.67	54.00	52.00	3	
4	Market research	20.67	22.00	20.00	20.89	8	
5	Market trend	92.00	100.00	100.00	97.33	1	0.045*
6	Export market	20.00	22.67	20.00	20.89	7	
7	Improved marketing practices	39.33	50.67	36.00	42.00	5	0.009**
8	Warehouse facilities	23.33	27.33	20.00	23.56	6	
9	Futures trading	20.00	20.00	20.00	20.00	9	
One way ANOVA for market trend: Sig. 0.045**							

Source: Compiled from primary data

* Significant at 5% level

** Significant at 1% level

The highest index on market trend indicates that majority of farmers (97.3%) especially small and large farmers highly need information on market trend. This is similar to the findings of Yadhav and Singh (2010) that prevailing market price of the commodities and comparative prices in nearby markets are the major information needs of farmers. Compared to marginal farmers, small and large farmers are cultivating diversified crops (Table 4.3) and have more access to private traders and farmers' market (Table 4.9). Market profile got second highest index which shows that respondent farmers are interested in finding out new markets for the produce and to take advantage of price difference in different markets.

The least indices are obtained for information needs on futures trading, market research and export market which implies that these are the information which are least needed by the farmers. Majority of farmers' production is not meant for large scale commercial purpose. Modern innovative marketing mechanism like futures trading is not known to most of the respondent farmers irrespective of farmer category. The results of market research studies have not reached them and hence the farmers suggested that authorities should take necessary action to make these findings beneficial to them. Regarding export market, only a small portion of the farmers expressed their desire to get information about it.

Chi-Square test of independence was employed to identify whether there is any significant relationship between marketing information needs and category of farmers. It was found that information needs on market trend and improved marketing practices are significantly related to category of farmers. One way ANOVA test was performed to know whether marketing information needs are significantly different among different category of farmers. The result showed that information need on market trend is significantly different among marginal, small and large farmers.

4.5.1 Awareness, access and gap in information on marketing

In this section, an attempt is made to identify the level of knowledge of the farmers regarding marketing information and their search for new information in order to fulfill the information needs and use it in their marketing operations. The information gap measured as the difference of awareness and access to marketing information is useful in identifying the information that the farmers access regularly and its importance in the marketing operation. The awareness, access and gap in the above identified and classified nine components of marketing information (Table 4.18) are presented in the following subsections.

4.5.1.1 Awareness, access and gap in information on input supply

Information about input supply such as seeds, fertiliser, machinery, pesticides, herbicides etc. regarding what input to use, how much to use, when and from where to purchase, are very crucial for the farmer. Information on availability of inputs is an important parameter that helps farmers access better inputs and increase adoption of modern varieties of seeds and other technologies. This will in turn increase the yield and profit of the farmers. The major input suppliers of the respondent farmers are Krishi Bhavan, private stores and co-operative societies (Table 4.8). The awareness, access and gap regarding the information on input supply of the respondent farmers are presented in Table 4.19.

Table 4.19 Awareness, access and gap in information on input supply

Sl. No.	Type of farmer	Awareness	Access	Information Gap (Aware but no access)
1	Marginal Farmer	30(100)	30(100)	0(0)
2	Small Farmer	30(100)	30(100)	0(0)
3	Large Farmer	30(100)	30(100)	0(0)
4	**All Farmers**	90(100)	90(100)	0(0)

Source: Compiled from primary data
Note: Figures in simple bracket represent percentage share of each to category total

Table 4.19 shows that cent percent of the farmers are aware of and have access to information on input supply. Farmers are well aware of the kind and quality of inputs to be used for the crops, quantity, timing and the sources of inputs. For further details and clarification if any, they have access to the Secretary of Padasekharam, suppliers of inputs such as Krishi Bhavan, private stores and co-operative societies and other fellow farmers. The information gap is nil for input

supply which means that farmers are aware of the available information and are accessing the same as and when they require.

4.5.1.2 Awareness, access and gap in information on market profile

Market profile is the available markets for the produce of the farmers. Farmers need information on those markets which can be conveniently accessed by them so as to ensure a fair price for their products. The major market of paddy farmers is SUPPLYCO whereas Krishi Bhavan is the major marketing agency for coconut farmers. Rubber farmers sell their produce to private traders and co-operative societies while in the case of nutmeg and arecanut farmers, private traders is the only market. The respondents depend on farmers' market like VFPCK and Farmers' Clubs for selling banana and other perishable crops (Table 4.9). The awareness, access and gap in information among farmers regarding market profile is shown in Table 4.20.

Table 4.20 Awareness, access and gap in information on market profile

Sl. No.	Type of Farmer	Awareness	Access	Information Gap
1	Marginal Farmer	30(100)	26(86.7)	4[13.3]
2	Small Farmer	30(100)	30(100)	0[0]
3	Large Farmer	30(100)	30(100)	0[0]
	All Farmers	90(100)	86(95.6)	4[4.4]
Chi-Square: Asymp. Sig. 0.015*(access)				

*Significant at 1%

Source: Compiled from primary data

Note: (i) Figures in simple bracket represent percentage share of each to category total

(ii) Figures in square brackets represent percentage share of gap to awareness

Table 4.20 reveals that cent percent of the farmers have awareness about market profile information, but a few of the marginal farmers are not accessing the information. Information on market profile is mainly accessed by farmers from newspapers. Although there is information gap, it is very less (13.3%) since majority

of the farmers are aware about the market for their product and most of them have access to newspaper for getting information about available markets. Other fellow farmers are also an important source of information to farmers.

Chi- Square test of independence was performed to identify whether there is any significant relationship between access to market profile and category of farmers. Result shows that the access to market profile information is significantly related to category of farmers which means that small and large farmers are accessing marketing information more than marginal farmers.

4.5.1.3 Awareness, access and gap in information on grades and standards

Farmers who are cultivating commercial crops such as rubber and paddy need information on grades and standards of the product. Rubber farmers need information on grades and standards of rubber sheet specified by the Rubber Board from time to time so that proper market can be ensured. Similarly paddy farmers also require information on the level of moisture content of paddy before supplying it to SUPPLYCO. The awareness, access and gap in information on grades and standards are presented in Table 4.21.

Table 4.21 Awareness, access and gap in information on grades and standards

Sl. No.	Type of Farmer	Aware	Access	Information Gap
1	Marginal Farmer	12(40)	11(36.7)	1[8.3]
2	Small Farmer	16(53.3)	16(53.3)	0[0.0]
3	Large Farmer	17(56.7)	16(53.3)	1[5.9]
4	**All Farmers**	45(50)	43(47.8)	2[4.4]

Source: Compiled from primary data

Note: (i) Figures in simple bracket represent percentage share of each to category total

(ii) Figures in square brackets represent percentage share of gap to awareness

Table 4.21 reveals that 50 per cent of the farmers are aware of information on grades and standards, but access to the information are slightly less. Hence information gap is narrow (4.4%). Large farmers who are cultivating rubber are mostly in need of information on grades and standards and they are obtaining it from newspapers. Paddy farmers are getting information directly from the office of SUPPLYCO at Ayyanthole, Thrissur or by telephone and from fellow farmers. Half of the respondent farmers are not aware and do not access information on grades and standards because they do not require such information as they are engaged in the cultivation of other crops such as coconut, banana, nutmeg and arecanut, which do not have any standard specifications at the famer level.

4.5.1.4 Awareness, access and gap in information on market research

Market research conducted by individuals, academic and research institutions, government organisations, NGOs and private agencies in agriculture are informative for the farmers and their adoption may lead to better income for the farmers. Such studies are being funded by Central and state governments through universities and institutions to enable the farmers to reap benefits from the findings of the studies. The level of awareness, access and gap in information on market research are given in Table 4.22.

Table 4.22 Awareness, access and gap in information on market research

Sl. No.	Type of Farmer	Awareness	Access	Information Gap (Aware but no access)
1	Marginal Farmer	0(0)	0	0[0]
2	Small Farmer	1(3.3)	0	1[100]
3	Large Farmer	0(0)	0	0[0]
4	All Farmers	1(1.1)	0	1[100]

Source: Compiled from primary data
Note: (i) Figures in simple bracket represent percentage share of each to category total
(ii) Figures in square brackets represent percentage share of gap to awareness

It is clear from Table 4.22 that all the farmers except one small farmer are not aware of the availability of the results of market research and hence do not access the information. Information on market research is one of the last information needs of farmers in the order of priority (Table 4.18). Farmers do not feel the need for it since they consider no practical utility for it. Hence findings of market research intended for the farmers have not been adopted at all by the farmers in the study area. Policy makers and institutions involved in conducting market research should take initiative to ensure that findings of market research are reaching the farmers at the right time. Sensitisation programmes at the initiative of local self governments and institutions involved in research are highly essential so that the findings of the market research become beneficial to farmers.

4.5.1.5 Awareness, access and gap in information on market trend

Market trend include information on current market price, forecasted future price, historical price trend, comparative price in different markets and procurement price fixed by Government of India and Government of Kerala from time to time. Farmers should know current market price so that they can ensure that the produce is

not being sold at a low price. Also historical price information will help the farmers to predict the future price of the produce and the fluctuation in price. They can adjust their production in accordance with the expected future price. There is wide variability in prices of different crops across markets that will help the farmers to arbitrage. There are changes in government announced prices for procurement of crops such as paddy, coconut, rubber etc. The trend and pattern of markets will enable the farmers to decide whether to hold their produce or to sell them. The level of awareness, access and gap regarding information on market trend is illustrated in Table 4.23.

Table 4.23 Awareness, access and gap in information on market trend

Sl. No.	Type of Farmer	Awareness	Access	Information Gap
1	Marginal Farmer	30(100)	30(100)	0[0]
2	Small Farmer	30(100)	30(100)	0[0]
3	Large Farmer	30(100)	30(100)	0[0]
4	**All Farmers**	90(100)	90(100)	0[0]

Source: Compiled from primary data

Note : (i) Figures in simple bracket represent percentage share of each to category total
(ii) Figures in square brackets represent percentage share of gap to awareness

It is evident from Table 4.23 that cent percent of farmers are aware of the available information on market trend and all of them are accessing the information that they are aware about. It is to be noted that information on market trend is the most wanted information of the farmers. (Table 4.18). All the farmers are accessing day to day market prices for the produces from newspaper. The information gap is nil for market trend, since most of the traditional media such as newspaper, farm magazines, radio etc. and the modern ICT modes of information like television primarily deliver information on markets and prices. Moreover, farmers, especially marginal farmers have direct access to market such as farmers' club and Krishi

Bhavan for getting price information. Fellow farmers are also an important source of information to farmers.

4.5.1.6 Awareness, access and gap in information on export market

Exporting goods to other countries involves lengthy procedure and formalities following the procedures framed by the exporting country as well as by the importing country. In the study area none of the farmers are exporting their produce and majority of them are doing subsistence farming. Awareness, access and gap regarding export market are presented in Table 4.24.

Table 4.24 Awareness, access and gap in information on export market

Sl. No.	Type of Farmer	Awareness	Access	Information Gap
1	Marginal Farmer	5(38.5)	0(0)	5[100]
2	Small Farmer	3(23.1)	0(0)	3[100]
3	Large Farmer	5(38.5)	0(0)	5[100]
4	**All Farmers**	13(14.4)	0(0)	13[100]

Source: Compiled from primary data

Note : (i) Figures in simple bracket represent percentage share of each to category total
(ii) Figures in square brackets represent percentage share of gap to awareness

Majority of the farmer respondents are not aware of the export market and none of them have access to information on export market. They are actually not interested in getting information regarding export market which is evident from their opinion that the least needed information is about export market (Table 4.18). The agricultural production of the respondents is not of large scale and most of them undertake subsistence farming only.

4.5.1.7 Awareness, access and gap in information on improved marketing practices

Marketing practices is a comprehensive term which includes various operations from the point of production to that of marketing. It includes practices undertaken for pre - harvest care, harvest care, post - harvest care, marketing of the produce etc. In view of the keen competition in the domestic as well as international markets, Government of India has launched many awareness programmes to vigorously update the technical knowhow of various stakeholders involved, on multi – dimensional aspects of marketing of farm produce. Some of these marketing practices like grading can be done by the famers themselves so that they get a better price for their products. The information awareness, access and gap regarding improved marketing practices among the farmer respondents are depicted in Table 4.25.

Table 4.25 Awareness, access and gap in information on improved marketing practices

Sl. No.	Type of Farmer	Awareness	Access	Information Gap (Aware but no access)
1	Marginal Farmer	10 (33.3)	3(10)	7[70]
2	Small Farmer	15 (50)	7(23.3)	8[53.3]
3	Large Farmer	7(23.3)	2(6.7)	5[71.4]
	All Farmers	32(35.6)	12(13.3)	20[62.5]

Source: Compiled from primary data

Note : (i) Figures in simple bracket represent percentage share of each to category total
(ii) Figures in square brackets represent percentage share of gap to awareness

The farmer respondents are following traditional methods of marketing practices in the study area. Hence the awareness level of the farmers is too low at nearly 36 per cent. Among those who are aware, many are not accessing the

information, Hence the information gap is very high at nearly 63 per cent. The farmers are reluctant to change from their traditional marketing practices. Though, there are a number of programmes for the sensitisation of the farmers, it has not effectively reached the farmers. It is high time that the already existing sensitisation programmes on improved marketing practices are streamlined so that farmers are made aware of them as a result of which that they will access those information and adopt so as to reap better prices for their produce.

4.5.1.8 Awareness, access and gap in information on warehouse facilities

Storage is an important marketing function, which involves holding and preserving goods from the time they are produced until they are needed for consumption. Warehouses are scientific storage structures especially constructed for the protection of the quantity and quality of stored products. Farmers should have knowledge about the warehouse facilities available in their location, its importance, types of warehouses, working of warehouses and cost of storing of goods. During the harvesting season the market price of the produce will be less and if the farmers are able to hold the stock for a while they can get better prices. Moreover, the farmers can raise loans from banks on the security of the warehouse receipts issued by the warehouse keeper. The information awareness, access and gap regarding warehouse facilities is depicted in Table 4.26

Table 4.26 Awareness, access and gap in information on warehouse facilities

Sl. No.	Type of Farmer	Awareness	Access	Information access gap
1	Marginal Farmer	19(63.3)	10(33.3)	9[47.4]
2	Small Farmer	28(93.3)	21(70)	7[25]
3	Large Farmer	29(96.7)	27(46.6)	2[6.9]
4	**All Farmers**	76(84.4)	58(64.4)	18[23.6]
Chi-Square: Asymp. Sig. 0.000*(aware), 0.000*(access)				

Source: Compiled from primary data
Note: (i) Figures in simple bracket represent percentage share of each to category total
(ii) Figures in square brackets represent percentage share of gap to awareness

It is clear from Table 4.26 that most of the farmers (84%) are aware about warehousing facilities. Majority of them, (64.4%) especially small and large farmers have access to information on warehousing facilities. Some of them have constructed warehouses of their own. Warehousing facilities are provided by Krishi Bhavan for coconut farmers and SUPPLYCO for paddy farmers. The information gap is less since many of the farmers who are aware are accessing the information.

Chi-Square test of independence was performed to identify whether there is significant relationship between awareness and access to information on warehousing facilities and category of farmers. Result indicates that the information on awareness and access to warehouse facilities are significantly related to category farmers.

4.5.1.9 Awareness, access and gap in information on futures trading

Futures trading is relatively new to the Indian commodity markets. It benefits farmers by way of price discovery and an organised market place. In India, farmers do not directly participate in the commodity futures market. But they take advantage of the price signals that are derived in the futures market. Information awareness,

access and gap regarding futures trading among farmers in the study area are presented in Table 4.27.

Table 4.27 Awareness, access and gap in information on futures trading

Sl. No.	Type of Farmer	Awareness	Access	Information Gap (Aware but no access)
1	Marginal Farmer	1(3.3)	0(0)	1[100]
2	Small Farmer	2(6.7)	1(3.3)	1[50]
3	Large Farmer	2(6.7)	0(0)	2[100]
4	All Farmers	5(5.6)	1(1.1)	4[50]

Source: Compiled from primary data

Note: (i) Figures in simple bracket represent percentage share of each to category total
(ii) Figures in square brackets represent percentage share of gap to awareness

From Table 4.27, it is clear that majority of the farmers are unaware of futures trading. It is already seen that futures trading is one of the least needed information by farmers (Table 4.18). Farmers are not well aware of the benefits of the commodity trading and many of them are not educated enough to understand the intricacies and mechanism of futures trading. Hence even if information are available, they will not access it, unless they are being trained for it. As a result, the information gap is very high even with very few farmers having knowledge or awareness about it. In the study area, no farmer is carrying out futures trading and no one availing the benefit of price discovery from the derivative markets even though one farmer is having access to the information. Proper training at the grass root level of farmers is needed to encourage farmers in participating in futures trading and accessing the information.

To sum up, the most needed marketing information is about market trend and the least needed are on export markets, futures trading and market research. The market information gap is zero for input supply and market trend implying that

farmers have more access to these marketing information. Gap is high for information on improved marketing practices, futures trading and export markets since farmers rely on traditional method of marketing. It is suggested to have farmer sensitisation programmes from the part of authorities to make awareness among farmers about modern innovative marketing mechanisms.

4.6 Farmers' credit information needs, awareness, access and gap

Credit is essential for sustainable and profitable farming system. Agricultural credit is the amount of investment funds made available for agricultural production from resources outside the farm sector. Farmers need information about credit facilities, sources of credit, and terms and conditions of different sources of credit. In this section, the source – wise and facility – wise credit information needs of the farmers along with awareness, access and gap in credit information are analysed.

For the purpose of identifying the source – wise credit information needs of farmers, the sources of credit were classified into public sector banks, private sector banks, co-operative banks, regional rural bank, NBFC and money lenders. The credit information needs were ranked based on a five point scale. For finding out the information needs on sources of credit, average score is computed by dividing the total score of all statements under a source by the number of statements and ranked the source according to the average score. The source – wise credit information needs of respondents are presented in Table 4.28.

Table 4.28 Credit information needs of farmers: Source – wise and Farmer category - wise

Sl No	Information needs on source of credit	Average score of information needs				Rank
		Marginal	Small	Large	Total	
1	Public sector banks	79.0	72.3	76.7	239.6	2
2	Private sector banks	34.6	38.6	44.1	117.6	4
3	PACS	101.3	84.6	118.0	322.9	1
4	Regional Rural Banks	60.3	70.7	84.0	216.6	3
5	NBFC	34.0	30.0	34.0	98.0	5
6	Moneylenders	25.7	30.0	30.6	90.6	6

Source: Compiled from primary data

The highest average score of information need is obtained by PACS followed by public sector banks. This supports the earlier finding that PACS are the most favourite source of credit for the farmers. (Table 4.5). The lowest indices are for money lenders and NBFC, which implies that the farmers are not interested in getting information about their services. Public sector banks are also a preferred source of credit for the farmers since branches of State Bank of Travancore (SBT), Union Bank of India and Syndicate Bank are accessed frequently by the farmers. At the same time respondents have limited knowledge about credit facilities of Regional Rural Bank and they are interested to know more about the terms and conditions of RRBs.

4.6.1 Awareness, access and gap in information on credit: Source - wise

Farmers should be aware about different sources of credit so that they can choose the best source to them in terms of proximity, cost, processing time, repayment period, amount of loan, security etc. At the same time, farmers should have access to information on the terms and conditions of different sources of credit. Table 4.29 shows the source – wise awareness, access and gap in credit information of the farmers.

Table 4.29 Awareness, access and gap in credit information: Source - wise

Sl. No.	Information	Awareness	Access	Information gap (Aware but not accessed)
A	**Public sector banks**			
1	Eligibility conditions	75(83.3)	54(60.0)	21[28.0]
2	Procedural formalities	73(81.1)	30(33.3)	43[58.90]
3	Documents	74(82.2)	42(46.7)	32[43.24]
4	Interest	71(78.9)	28(31.1)	43[60.56]
5	Loan amount	70(77.8)	29(32.2)	41[58.57]
6	Mode of repayment	72(80.0)	39(43.3)	33[45.83]
7	Security	90(100)	90(100)	0(0)
B	**Private sector banks**			
1	Eligibility conditions	61(67.8)	27 (30.0)	34[55.7]
2	Procedural formalities	59 (65.6)	2 (2.2)	57[96.6]
3	Documents	59 (65.6)	26 (28.9)	33[55.9]
4	Interest	59 (65.6)	5 (5.6)	54[95.5]
5	Loan amount	49 (54.4)	1 (1.1)	48[97.9]
6	Mode of repayment	50 (55.6)	1 (1.1)	49[98.0]
7	Security	60 (66.7)	22 (24.4)	38[63.3]
C	**PACS**			
1	Eligibility conditions	75(83.3)	55(61.1)	20[26.7]
2	Procedural formalities	75(83.3)	51(56.7)	24[32.0]
3	Documents	75(83.3)	52(57.8)	23[30.7]
4	Interest	76(84.4)	52(57.8)	24[31.6]
5	Loan amount	73(81.1)	51(56.7)	22[30.1]
6	Mode of repayment	74(82.2)	52(57.8)	22[29.7]
7	Security	74(82.2)	52(57.8)	22[29.7]

D	Regional Rural Banks			
1	Eligibility conditions	41(45.6)	14(15.6)	27[65.9]
2	Procedural formalities	39(43.3)	8 (8.9)	31[79.5]
3	Documents	40(44.4)	13(14.4)	27[67.5]
4	Interest	38(42.2)	8(8.9)	30[78.9]
5	Loan amount	38(42.2)	8(8.9)	30[78.9]
6	Mode of repayment	39(43.3)	8(8.9)	31[79.5]
7	Security	40(44.4)	12(13.3)	28[70.0]
E	NBFC			
1	Eligibility conditions	19(21.1)	1(1.1)	18[94.7]
2	Procedural formalities	19(21.1)	1(1.1)	18[94.7]
3	Documents	18(20.0)	1(1.1)	17[94.4]
4	Interest	18(20.0)	1(1.1)	17[94.4]
5	Loan amount	19(21.1)	1(1.1)	18[94.7]
6	Mode of repayment	19(21.1)	1(1.1)	18[94.7]
7	Security	18(20.0)	1(1.1)	17[94.4]
F	Money lenders			
1	Eligibility conditions	74(82.2)	0(0)	72[97.3]
2	Procedural formalities	75(83.3)	0(0)	73[97.3]
3	Documents	75(83.3)	0(0)	73[97.3]
4	Interest	75(83.3)	0(0)	73[97.3]
5	Loan amount	75(83.3)	0(0)	73[97.3]
6	Mode of repayment	75(83.3)	0(0)	73[97.3]
7	Security	75(83.3)	0(0)	73[97.3]

Source: Compiled from primary data

Note: (i) Figures in simple brackets represent percentage share of each to total farmers

(ii) Figures in square brackets represent percentage share of gap to awareness

Regarding the awareness about sources of credit, more than 75 percent of the farmers are aware about PACS, public sector banks and money lenders in the study area. Majority of the farmers have better access to information about the terms and conditions of PACS and public sector banks because of their personal relationship with the bank and approachability to these banks. They can access the information directly in person or through telephone. Hence information gap is comparatively low for PACS and public sector bank. In the case of money lenders, even though farmers are well aware of terms and conditions of credit, they are not accessing information. It is already seen that money lenders are completely avoided by the respondent farmers for availing credit (Table 4.5). In the case of RRB, branches of Kerala Grameen Bank are functioning in the study area. Farmers' access to information on terms and conditions of RRB is less since it has not got enough popularity among farmers in the study area. Farmers are aware about the terms and conditions of loan facilities of private banks especially interest rate, but they have no access to information about it. None of the farmers are availing credit from the private banks.

Though the most preferred source of credit is PACS, some farmers pointed out that interest rate and margin money charged by co-operative bank are high compared to public sector banks. Public sector bank is also popular among farmers. Presence of branches of SBT, Syndicate Bank and Union Bank of India in the study area increases availability of credit to the farmers. High interest rate and unapproachable treatment of customers are the main reasons of farmers for not accessing private bank.

4.6.2 Credit information needs of farmers: Facility – wise

Banks as a financial institution offers different types of credit facilities to farmers. In the present study the credit facilities are classified into agricultural finance, consumption finance and interest subvention scheme and subsidies. Under agricultural finance, banks are providing a number of credit facilities such as crop loan, Kisan Credit Card, Differential Rate of Interest Scheme, agricultural gold loan,

and loans for purchase of land, land development, minor irrigation, mechanisation and horticulture. Agricultural gold loan and Kisan Credit Card are the most popular among them in the study area. Consumption loans include housing loan, personal loan, vehicle loan and education loan. Home loan is the most availed consumption finance. The next attempt is to identify the information needs associated with these credit facilities. For this purpose, information needs of farmers on different types of credit facilities were rated on a five point scale and an index was developed using it. Based on the index, information needs are ranked and is shown in Table 4.30.

Table 4.30 Credit information needs of farmers: Facility – wise

Sl. No	Information needs on credit facilities	Information needs index				Rank	Aymp. Sig.
		Marginal	Small	Large	Total		
A	**Agricultural finance**						
1	Crop loan	54.7	74	78	68.8	3	
2	Kisan Credit Card	74	86.7	92	84.2	1	
3	DRI scheme	26	25.3	25.3	25.3	6	
4	Agricultural gold loan	73.3	86.6	92	84	2	
5	Loans for land purchase	25.3	22.7	22.7	23.5	8	
6	Loan for land development	20	22.6	25.3	22.7	9	
7	Credit for minor irrigation	22.6	28	28	26.22	5	
8	Credit for mechanisation	46.7	77.3	78	67.3	4	0.003**
9	Finance to horticulture	22.6	25.3	22.6	23.6	7	
10	Other agricultural term loans	20	25.3	22.7	22.6	10	
B	**Consumption loans**						
1	Housing loan	28	25.3	20	24.4	1	
2	Personal loan	20	20	20	20	3.5	
3	Vehicle loan	20	20	20	20	3.5	
4	Education loan	22.7	20	20	20.9	2	
C	**Interest subvention scheme & subsidies**	91.3	100	100	97.1	1	

** Significant at 1% level
Source: Compiled from primary data

As per Table 4.30, the highest index is for Interest Subvention Scheme and Subsidies, which implies that it is the most needed information about credit as far as the farmers are concerned. There are changes in the Interest Subvention Scheme and allotment of funds for giving subsidy to farmers in every Union Budget. Central Government's recently introduced Direct Benefit Transfer (DBT) Scheme has increased the information needs of the farmers. Among agricultural finance, the

highest index is obtained by Kisan Credit Card followed by agricultural gold loans. The most popular agricultural credit facility among farmers is KCC followed by agricultural gold loans. As already seen, in the case of KCC, most of the farmers have availed crop loan ranging from Rs.50000 to Rs. 300000 with an interest rate of 4% after subsidy (Table 4.6). Among consumption loans, farmers need information on home loan.

Chi-Square test of independence was employed to see whether there is significant relationship between type of credit facilities and the category of farmers. It was found that information needs on farm mechanisation is significantly related to category of farmers

4.6.3 Awareness, access and gap in information on credit: Facility - wise

In India, a multiagency approach exists in the distribution of credit to the farmers. Though many schemes and programmes are offered by the Government and other institutions to the farmers, they are unaware about the details of many of these schemes and have no access to them. Hence the level of awareness, access and gap in information on credit, facility – wise is analysed and depicted in Table 4.31.

Table 4.31 Awareness, access and gap in information on credit: Facility - wise

Sl. No	Types of credit facilities	Aware	Access	Information gap
A	**Agricultural finance**			
1	Crop loan	51(56.7)	4(4.4)	49 [96.0]
2	Kisan Credit Card	53(58.9)	45(50)	8 [14.5]
3	DRI scheme	2(2.2)	2(2.2)	0 [0.0]
4	Agricultural gold loan	84(93.3)	13(14.4)	71 [84.5]
5	Loans for land purchase	2(2.2)	0(0.0)	2 [100]
6	Loan for land development	0(0.0)	0(0.0)	0[0.0]

7	Credit for minor irrigation	6(6.7)	0(0.0)	0[0.0]
8	Credit for mechanization	67(74.4)	26(28.9)	41[61.2]
9	Finance to horticulture	0(0.0)	0(0.0)	0[0]
10	Other agricultural term loans	1(1.1)	0(0.0)	1[100]
B	**Consumption loans**			
1	Home loan	78(86.7)	4(4.4)	74[94.87]
2	Personal loan	80(88.9)	1(1.1)	79[98.75]
3	Vehicle loan	80(88.9)	1(1.1)	79[98.75]
4	Education loan	80(88.9)	2(2.2)	78[97.5]
C	**Interest Subvention Scheme & subsidies**	85(94.4)	83(92.2)	2[2.35]

Source: Compiled from primary data

Note: (i) Figures in simple bracket represent percentage share of each to category total

(ii) Figures in square brackets represent percentage share of gap to awareness

Table 4.31 shows the awareness and access of the respondents about information needs on credit, facility - wise. The awareness and access is the highest for Interest Subvention Scheme and subsidies resulting in the lowest information gap. All the consumption loans have very high awareness, but access is very low resulting in wide information gap. It noteworthy that KCC, though very popular among farmers and is in the first place with respect to availing by farmers, the awareness about it among farmers is less than that of agricultural gold loans. It is interesting to note that some of the farmers are not aware that the loans that they are taking is under the KCC Scheme, though they are availing it. Even though the Card is given to them for using in ATMs, they are keeping it under lock and key without knowing the use of it. And they withdraw the money from their KCC account over the counter at the bank. The awareness and access of loan for land development, horticulture, land purchase and minor irrigation are very poor.

In a nutshell, farmers mostly need credit information on the facilities of PACS and they need least that of non-institutional sources. They are well aware of

and access the information on credit facilities of PACS. Regarding credit facilities, the most needed information is on Interest Subvention Scheme and subsidies. In the case of agricultural finance, farmers highly need information on KCC, since they want to know more about the facility which they are availing now. Information gap is more in the case of consumption finance than agricultural finance.

Subsequent to the discussion on identification of the information needs of farmers in Thrissur district with respect to marketing and credit, the next two sections are devoted to study the extent of use of ICT by the farmers for getting these marketing and credit information respectively. In the following section, the extent of use of ICT tools for obtaining marketing information by farmers is analysed by examining the access gap and usage gap of information from ICT tools.

4.7 Extent of use of ICT tools for marketing information

Accurate and timely market information can make positive benefits to farmers. Upto date, or current market price enable the farmers to carry out transaction with traders from a position of greater strength. Analysis of historical market information enables farmers to make planting decisions in line with the consumer demand. Use of ICT tools will facilitate the farmers in getting accurate and timely marketing information and to make the farming operations more profitable. A brief discussion on ICT tools such as newspaper, farm magazines, radio, television, telephone and computer used by the farmer respondents in the study area for obtaining marketing information is given in the ensuing paragraphs as a prelude to the analysis of the extent of use of ICT tools for market information.

Newspaper is a valuable source of market information to the farmers. Market information is published in daily newspapers and weekly supplements. In most of the newspapers there is separate section for market. Market information in newspaper include price of various commodities in different markets, changes in

procurement price of paddy, coconut and rubber, national and international prices and markets of various commodities etc. In the study area the popular newspapers are Mathrubhumi, Malayala Manorama, Deshabhimani and Keralakaumudi.

Farm magazines publish price schedules of various commodities. It also publishes articles detailing market and prices of different commodities after examining the fluctuations in prices and exploring the reasons for it. In the study area, the most popular farm magazines are Karshakasree, Kerakarshakan, Kalpadenu, Coconut Journal and Rubber.

Radio is one of the traditional ICT tools which deliver agricultural information. Marketing information is provided through the farm news broadcasted through the radio and "farm and home" programme. In the study area, even though most of the farmer respondents are possessing radio, many of them are not using it because of the popularity of television. Some of the farmers are listening to many of the programmes irrespective of whether it is agricultural programme or not.

Television is an ICT tool which is possessed by most of the respondents in the study area. Many television channels like Doordarshan, Asianet, Kairali and Surya through their various agricultural programmes and agricultural news provide information about market and prices of various agricultural commodities. Most popular agricultural programmes in television among respondents are Krishideepam telecast by Asianet, followed by Krishidharshan of Doordarshan.

Telephone, another ICT tool, include both land phone and mobile phone. In the study area there is no respondent who is not possessing telephone. Telephone is used by the farmers for getting information regarding input supply from Krishi Bhavan, and price information from private traders.

Information Technology-enabled interventions have led to large scale farmer empowerment and have shown a roadmap to accelerate the growth of Indian agriculture. Computer and internet is the least preferred source of information of respondent farmers. Some of the farmers, especially large farmers have access to

information on computer since they possess computer and internet whereas some of the marginal and small farmers have computer, but no internet connectivity.

The awareness, access and access gap in obtaining market information through the above mentioned ICT tools is analysed in the following section. . Here awareness is the knowledge of farmers regarding availability of information on ICT tools whereas access is the availability plus approachability to a particular ICT tool for getting information. The gap shows the obstacle in accessing information from the ICT tools.

4.7.1 Awareness, access and gap in marketing information through ICT tools

Marketing information is provided to the farmers by different sources. The awareness about the availability of marketing information is a precondition in using ICT for marketing purpose. For retrieving marketing information from various sources, it is essential to be aware about the information availability from each source such as newspaper, farm magazines, radio, television, telephone, and computer. Farmers should have accessibility to these sources so that they can use it for making effective decisions. The awareness, access and gap in accessing marketing information by farmers through each of these sources are presented in Table 4.32.

Table 4.32. Awareness, access and gap in marketing information using ICT tools

Sl. No	ICT tools	Marginal farmers			Small farmers			Large farmers			Total		
		Aware	Access	Gap	Aware	Access	Gap	Aware	Access	Gap	Aware	Access	Gap
1	Newspaper	30 (100)	26 (100)	4 [13.3]	30 (100)	30 (100)	0 [0.0]	30 (100)	30 (100)	0 [0.0]	90 (100)	86 (95.6)	4 [4.4]
2	Farm magazines	30 (100)	6 (20.0)	24 [80.0]	30 (100)	11 (36.7)	19 (63.3)	30 (100)	16 (53.3)	14 [46.7]	90 (100)	33 (36.6)	57 [29.6]
3	Radio	30 (100)	10 (33.3)	20 [66.7]	29 (96.7)	13 (43.3)	16 [60.0]	29 (96.7)	13 (43.3)	16 [60.0]	88 (97.8)	36 (40.0)	52 [62.2]
4	Television	30 (100)	27 (90.0)	3 [10.0]	30 (100)	28 (93.3)	2 [6.7]	30 (100)	28 (93.3)	2 [6.7]	90 (100)	83 (92.2)	7 [7.8]
5	Telephone	30 (100)	27 (90.0)	3 [10.0]	30 (100)	29 (96.7)	1 [3.3]	30 (100)	29 (96.7)	1 [3.3]	90 (100)	85 (94.4)	5 [5.5]
6	Computer & Internet	29 (96.7)	4 (13.3)	25 [86.0]	29 (96.7)	4 (13.3)	25 [86.0]	30 (100)	9 (30.0)	21 [70.0]	88 (97.8)	18 (20.0)	70 [77.8]

Source: Compiled from primary data

Note : (i) Figures in simple bracket represent percentage share of each to category total

(ii) Figures in square brackets represent percentage of farmers not accessed to aware

It is found from Table 4.32 that more than 90 per cent of farmers are aware of and have access to marketing information through newspaper, telephone and television. The all time favourite source of market information to the farmers are newspaper in which they access price information which includes daily market price and prices in other markets. Lively and Nuthall (1983) have also reported that daily newspaper can provide constantly changing marketing information. Along with this farmers are occasionally reading articles on agricultural market in the newspaper. Information gap is observed only for marginal farmers. This is because of their lack of accessibility to the newspaper as they are not subscribing to newspaper. Chi- Square statistic, significant at one per cent also confirms that the access to market information through newspaper is significantly related to category of farmers. It implies that marginal farmers have less access to marketing information on newspaper compared to small and large farmers. It is already seen that there are four marginal farmers who have annual family income upto Rs 10000 (Table 4.1).

After newspaper, telephone is the most widely used ICT tool by the farmers, since all the respondents possess it. Market information regarding input supply and price information from private traders are obtained by the farmers through telephone. Though access gap is marginal for telephone, farmers have no knowledge about the central and state sponsored services through telephone like Kisan Call Centre, Green SIM card of IFFCO Kisan Sanchar Limited, private initiatives like Tata Consultancy Services' **mKRISHI®** and Lifelines India. But many of the farmers are getting information on weather updates on their mobile phone from the Agromet Advisory Services prepared by the Department of Agricultural Meteorology, College of Horticulture, Kerala Agricultural University, and the Department of Agriculture, Government of Kerala.

Cent percent of the farmers are aware about marketing information through television and majority of the respondents (92.2%) have access to it. Farmers have knowledge about agricultural news and programmes in various channels. Majority of the farmers are observing the price and market related information in news and agricultural programmes in private channels. A small portion of the farmers who have no access to cable network are watching agricultural programmes in Doordarshan. The information access gap is very low in the case of television as an ICT tool for disseminating information on agriculture.

Majority of farmers (97.8%) are aware about the availability of marketing information on computer and internet, but a few of them only (20%) have access to it. Although farmers are aware of price information provided through the websites of VFPCK and farmers market, only a few farmers (20%) have access to information from these sources. This is because, majority of the farmers lack technical skill for operating computers and most of the marginal and small farmers have no computer facility with internet connectivity at home. Above all, farmers are aware only about the internet enabled centres and agricultural portals at their locality. They do not have knowledge about various IT enabled initiatives of the central and state governments, including the information provided through the website and agricultural portal of Kerala Agricultural University. Large farmers have more awareness and access to information on computer and internet than other farmers since they are having computer with internet connectivity which is not common among small and marginal farmers. The findings of Yadav and Singh (2010) that large farmers have better access to the marketing information system and computer and internet support the findings of this study.

In the case of radio, farmers are aware of price information provided through agricultural news and the popular "farm and home" programme. But the access to

information is less. Radio has become outdated because of increasing popularity of television. Hence presently majority of farmers are not using it. This shows the changing trend among farmers regarding the use of radio. But some farmers still have the regular listening behaviour of agricultural programmes in radio. Raja *et al.* (2009), has also reported that considerable proportion of farmers have regular radio listening behaviour for getting farm related information.

Though cent percent of the farmers are aware of marketing information in farm magazines, many of the farmers are not accessing it. Hence the information access gap is very high in the case of farm magazines. It is the category of large farmers who are accessing farm magazines more, compared to other two categories. Respondents are aware about price schedules published in the farm magazines. Some of the farmers have the habit of reading marketing related articles published in farm magazines. Poor access to farm magazines is the major cause for access gap. Cost of subscription and non-utility for small scale cultivation are the main hindrances for access to farm magazines. Large farmers constitute major share in the total subscribers to farm magazines since they are dominating in the higher income category. Results of Chi Square Test reveal that access to information on farm magazines is significantly related to category of farmers. Large farmers have better access to farm magazines compared to small and marginal farmers since they are dominating in the higher income bracket (Table 4.1).

Even if farmers have awareness and access to marketing information through ICT tools, they may not use the information for farm operations. Awareness and access to marketing information alone will not benefit the farmers; there should be actual use of the information by the farmers. Hence the next attempt is to find out the actual use of the information accessed through ICT tools. Usage gap as a difference

between access and use, of marketing information through different ICT tools is discussed in the following section.

4.7.2 Access, usage and usage gap in marketing information through ICT tools

It is found that farmers have better accessibility to information through newspaper, telephone and television; computer, radio and farm magazines have less accessibility. In this section it is examined whether the farmers are actually using the information accessed through each of these ICT tools for their agricultural operations. The access, usage and usage gap of ICT tools are depicted in Table 4.33.

Table 4.33 Access, usage and usage gap in marketing information using ICT tools

Sl. No	ICT tools	Marginal farmers			Small farmers			Large farmers			Total		
		Access	Usage	Gap	Access	Usage	Gap	Access	Usage	Gap	Access	Usage	Gap
1	Newspaper	26 (86.7)	26 (86.7)	0 [0.0]	30 (100)	30 (100)	0 [0.0]	30 (100)	30 (100)	0 [0.0]	86 (95.6)	86 (95.6)	0 [0.0]
2	Farm magazines	6 (20.0)	4 (13.3)	2 [33.3]	11 (36.7)	11 (36.7)	0 [0.0]	16 (53.3)	16 (53.3)	0 [0.0]	33 (36.7)	31 (34.4)	2 [33.3]
3	Radio	10 (33.3)	4 (13.3)	6 [60.0]	13 (43.3)	7 (23.3)	6 [46.1]	13 (43.3)	6 (20.0)	7 [53.8]	36 (40.0)	17 (18.9)	19 [21.0]
4	Television	27 (90.0)	11 (36.6)	16 [59.2]	28 (93.3)	19 (63.3)	9 [32.1]	28 (93.3)	19 (63.3)	9 [32.1]	83 (92.2)	49 (54.4)	34 [65.1]
5	Telephone	27 (90.0)	10 (33.3)	17 [63.0]	29 (96.7)	22 (75.9)	7 [24.1]	29 (96.7)	22 (75.9)	7 [24.1]	85 (94.4)	54 (60.0)	31 [36.5]
6	Computer & internet	4 (13.3)	0 (0.0)	4 [100]	5 (16.7)	0 (0.0)	5 [100]	9 (30.0)	1 (3.3)	8 [88.9]	18 (20.0)	1 (1.1)	17 [94.4]

Source: Compiled from primary data

Note : (i) Figures in simple bracket represent percentage share of each to category total

(ii) Figures in square brackets represent percentage of farmers not accessed to aware

It is seen from Table 4.33 that there is no usage gap in the case of newspaper for marketing information. All the respondents who have access to marketing information on newspaper are using it which indicate that newspaper is the most credible source of marketing information to the farmers. Some of them opined that they are not getting market price published in the newspaper for their produces in the open market. Chi-Square statistic is found to be significant at one per cent level which implies that the use of marketing information from newspaper is significantly related to category of farmers. ie. small and large farmers are using information from newspaper more than marginal farmers.

All the small and large farmers who have access to market information from farm magazines are using it. Hence there is no information usage gap in the case of this category of farmers. Those marginal farmers who have access but not using have stated that the market information from magazines are not useful for small scale cultivation and hence they are not using. The result of Chi-Square test shows that the use of information from farm magazines is significantly related to category of farmers. Small and large farmers are using information from farm magazines better than marginal farmers. It could be inferred that print media is the most credible and popular ICT tools among respondent farmers for marketing information since it is cheaper than other sources, can be accessed at their convenience and can be stored, unlike information through radio and television.

There is usage gap in the case of radio for all category of farmers. Although 40 per cent of the respondents have access to the information through radio, only 19 per cent are using it. Though they are accessing it, they have no time to make note and use it. Farmers are accessing newspaper more because there is no need to grasp the information quickly and they can access at any time.

The high usage gap is observed for computer and internet followed by television and telephone which shows that use of marketing information from these

tools are relatively less compared to print media This is because of the high credibility of print media especially newspapers than electronic media and telephone. Also majority of the farmers are belongs to the age category of above 55 and only one younger farmer with less than 35 years old among the sample respondents (Table 4.1). Most of the farmers are therefore unaware of vast amount of marketing information that can be retrieved from modern ICT tools.

Usage gap as the difference between access and actual use is zero for newspaper in the case of marketing information. But the usage gap is the highest in the case of computer and internet, followed by television, telephone and radio. As far as farm magazines are concerned, the usage gap is less because the access of the farmers to this tool is very limited. Usage gap is high for marginal farmers in the case of all ICT tools. Compared to small and large farmers, the dependence of ICT tools by marginal farmers are limited. Chi – Square test of independence has also shown that the use of some of the ICT tools for market information are related to farmer category. In short, newspaper is still the main source of market information to the farmers. It is cheaper than other sources, can be accessed at their convenience and can be stored, unlike information through radio and television.

4.7.3 Purpose of usage ICT tools for marketing information

Farmers are accessing various types of marketing information from ICT tools. It is essential to understand the purposes for which they are accessing ICT tools so that marketing information related to that area can be provided more in quantity and quality which will ultimately benefit the farmers. Purposes pointed out by the farmers are classified source- wise and is illustrated in Table 4.34.

Table 4.34 Purpose of using ICT for marketing information

Sl. No	Purpose	Marginal farmers	Small farmers	Large farmers	Total
1	**Newspaper**				
a)	Market profile	3	4	2	9 (10.47)
b)	Market Price	23	26	28	77(89.5)
	Total	26	30	30	86(100)
2	**Farm Magazines**				
a)	Market related article	1	4	1	6 (19.4)
b)	Market price	3	6	16	25(80.6)
	Total	4	10	17	31(100)
3	**Radio**				
a)	Market price	3	4	4	11(64.71)
b)	Marketing practices	1	3	2	6(35.29)
	Total	4	7	6	17(100)
4	**Television**				
a)	Market profile	1	2	7	10(20.41)
b)	Marketing practices	0	1	1	2(4.08)
c)	Inputs	0	2	0	2(4.08)
d)	Market price	10	14	11	35(71.43)
	Total	12	18	19	49(100)
5	**Telephone**				
a)	Inputs	2	6	4	12(22.2)
b)	Marketing	0	5	6	12(22.2)
c)	Input and marketing	7	11	12	30(55.7)
d)	Market Price	1	0	0	1(1.9)
	Total	10	22	22	54(100)

6	**Computer & internet**				
a)	Market price	0	0	1	1(100)
	Total	0	0	1	1(100)

Source: Compiled from primary data

Note: Figures in simple bracket represent percentage share of each to total

Table 4.34 reveals that all the ICT tools are accessed by majority of the respondent farmers for getting information on current market price except telephone. It is clear that information on current market price is the most important information for farmers since it has direct relation with profitability of farmers. All the respondent farmers need upto date and accurate market price information. As already seen, among the ICT tools, price information is accessed by majority of farmers from newspaper (Table 4.32) and there is no information usage gap for newspaper (Table 4.33). Newspaper is the highly credible and popular source of price information for the farmers in the study area. Telephone is used by the farmers to access information on input supply from Krishi Bhavan, private stores and co-operative society and also for identifying the price and market of their produces.

4.7.4 Credibility of marketing information from ICT tools

Credibility refers to the degree of trust-worthiness and expertness accorded to a source of information by the audience at a given time. Credibility of a source is not fixed, it is flexible, with the change of time and place. Use of an ICT tools depends on its credibility. If the tool is highly credible, it is used by the farmers most. For the purpose of measuring the credibility of ICT tools, ICT tools are rated using a five point scale and an index is developed using that scale. The credibility of ICT tool used by the farmers for marketing information is presented in Table 4.35.

Table 4.35 Credibility of marketing information from ICT tools

Sl. No	Information sources	Index	Rank
1	Newspaper	95.1	1
2	Farm magazines	34.4	4
3	Radio	18.9	5
4	TV	54.2	3
5	Telephone	60	2
6	Computer and internet	1.1	6

Table 4.35 makes it clear that the most credible source of marketing information among the ICT tools used by the farmer respondent is newspaper as indicated by the highest index obtained by it. The least credible ICT tool according to the respondent farmers is computer and internet followed by radio. It is noteworthy that, in this IT era also, newspaper remains as the most credible and popular ICT tool among farmers. Majority of the farmer respondents are in the age category of above 55 years, and they are unaware of information that can be accessed and used from modern ICT tools like computer and internet and telephone. Also they lack technical skills to operate these modern ICT tools. Hence, farmer respondent are relying on traditional sources like newspaper for getting marketing information.

4.8 Extent of use of ICT tools for credit information

Credit is an important input for agricultural operations. Adequate and timely credit will enable the farmers to purchase costly agricultural inputs and to raise alternative crops. Credit information is essential for the farmers, because it will help them to choose the sources which provide adequate, hassle free and cheap credit. ICT tools will help the farmers in getting information about different sources of credit, terms and conditions etc. A brief discussion on ICT tools such as newspaper, farm magazines, radio, television, telephone and computer used by the farmer respondents in the study area for credit information is given below.

Newspapers are providing information on various loans, terms and conditions, other banking services, financial products and financial policy changes in a simple manner which can be understood by the farmers. There is 'finance section' in every newspaper and also weekly supplements which are providing information on credit to the farmers.

Farm magazines, especially 'Krishiyankanam', the farm magazine of VFPCK is providing information on credit facilities and terms and conditions in a simple manner, in local language that can be understood by the farmers. According to the respondents, credit information is least available in farm magazines.

All India Radio, through their various farm broadcasts like 'farm and home programme' and farm schools are providing information on credit to the farmers. Credit information is broadcasted occasionally through radio although sometimes it is irrelevant and inadequate to the farmers.

Credit information is telecasted only occasionally by television channels. Local television channels are very active in telecasting credit information of financial institutions in the locality of farmers. In the study area, a local channel named "moon light" is providing credit information on due date of renewal in case of KCC, interest rates on loans and related policy changes to the farmers every day. Using telephones, farmers are accessing credit information from padasekharam, fellow farmers and banks and other financial institutions.

Computer and internet are another important source of credit information to the farmers in general. Farmers can visit the websites of the financial institutions providing credit, directly by using internet. But most of these are in English only. Also various agricultural portals are disseminating credit information to the farmers. In the study area, some of farmers are not directly using computer and internet for accessing credit information. Instead they seek the help of bank personnel and other computer centres for accessing credit information.

4.8.1 Awareness, access and gap in credit information through ICT tools

As already seen, print media, electronic media and telephone are disseminating credit information to the farmers. It is essential to know whether farmers are aware about the availability of information on the ICT tools and have accessibility to it. The awareness, access and access gap with respect to credit information through ICT tools are depicted in Table 4.36.

Table 4.37. Awareness, access and gap in credit information using ICT tools

Sl. No	ICT tools	Marginal farmers			Small farmers			Large farmers			Total		
		Aware	Access	Gap	Aware	Access	Gap	Aware	Access	Gap	Aware	Access	Gap
1	Newspaper	30 (100)	26 (83.3)	4 [13.3]	30 (100)	30 (100)	0 [0.0]	30 (100)	30 (96.7)	0 [0.0]	90 (100)	86 (95.6)	4 [4.4]
2	Farm magazines	30 (100)	4 (13.3)	24 [80.0]	30 (100)	11 (36.7)	19 [63.3]	30 (100)	16 (53.3)	14 [46.7]	90 (100)	31 (34.4)	14 [15.6]
3	Radio	30 (100)	10 (33.3)	20 [66.7]	29 (96.7)	13 (43.3)	16 [55.1]	29 (96.7)	13 (43.3)	16 [55.1]	88 (97.8)	36 (40.0)	42 [47.7]
4	Television	30 (100)	27 (90.0)	3 [10]	30 (100)	29 (96.7)	1 [3.3]	30 (100)	29 (96.7)	1 [3.3]	90 (100)	85 (94.4)	5 [5.6]
5	Telephone	30 (100)	26 (86.7)	4 [13.3]	30 (100)	30 (100)	0 [0.0]	30 (100)	29 (96.7)	1 [3.3]	90 (100)	85 (94.4)	5 [5.6]
6	Computer & Internet	28 (93.3)	4 (13.3)	24 [85.7]	30 (100)	5 (16.6)	25 [83.3]	30 (100)	9 (30.0)	21 [70.0]	88 (97.8)	18 (20)	71 [80.7]

Source: Compiled from primary data

Note : (i) Figures in simple bracket represent percentage share of each to category total

(ii) Figures in square brackets represent percentage of farmers not accessed to aware

It can be observed from Table 4.36 that all the farmers are aware of credit information available through ICT tools except radio and computer. Newspaper is accessed by majority of farmers except four marginal farmers for getting credit information similar in the case of marketing information. Farmers have better access to newspaper for credit information compared to other ICT tools. From newspaper, farmers are getting information like various types of loans and interest rate, other financial services offered by banks and financial institutions and the financial policy changes and its implication on interest rate. Similar to marketing information, the most popular and credible source of credit information to the farmers are newspaper. Chi-Square statistic is found to be significant at five per cent which implies that access to credit information from newspaper is significantly related to category of farmers. Since four marginal farmers have no access to newspaper and small farmers and large farmers constitute major chunk in the total credit availed by the respondent farmers (Table 4.7), small and large farmers are accessing credit information more, compared to marginal farmers.

Followed by newspaper, television and telephone are used by the farmers to access credit information especially small and large farmers. Television is also providing credit information regarding loans and services to the farmers. The local channel "moon light" is popular among respondents. Farmers opined that they have the habit of observing information related to Kisan Credit Card and interest rate of credit facilities of different banks and financial institutions in their locality through local channel. Regarding telephone, most of the farmers are using it to access credit information and subsidy from banks and other fellow farmers.

Information gap is high for computer and internet (78%), farm magazines (59%), and radio (69%). As in the case of marketing information, computer and internet are the least accessed by the farmers for credit information since they do not know how to search and retrieve information from internet. Though farmers are aware of agriculture portals and websites of banks and financial institution, none of them are

accessing credit information from these sources. Large farmers have comparatively better access to credit information on computer and internet. This is because, large farmers have better accessibility to computer and internet connectivity at home. As already seen majority of farmers belong to the age group of above 55 years and only one farmer is in the age group of below 35 years (Table 4.1). This is another reason for the non- popularity of internet as a mean to access credit information. Younger population is more interested in using computer and internet than older population. Since most of the respondent farmers belong to the old age category, the use of computer and internet is limited among respondents.

As seen in the case of marketing information, radio and farm magazines are the least preferred source of credit information to the farmers after computer and internet. According to the farmers, both these sources lack adequate and relevant information on credit. Farmers are not intentionally listening to radio for credit information. Respondent farmers who have the habit of listening to radio regularly are accessing credit information from radio than other farmers. Access to credit information from farm magazines is more for small and large farmers compared to marginal farmers as indicated by the Chi-Square statistic, significant at one per cent, implying that access to credit information from farm magazines is significantly related to category of farmers. It is interesting to note that, for information on credit, farmers are relying more on personal source of information such as fellow farmers, friends and relatives, farmer leaders, Secretary of Padasekharam and officials of banks and financial institutions than ICT tools. According to them, personal source of credit information is more trustworthy and reliable than credit information from ICT tools.

Even if farmers have awareness and access to credit information through ICT tools, they may not use the information for farm operations. Hence the next attempt is to find out the actual use of the credit information accessed through ICT

tools. Usage gap as a difference between access and use of credit information through different ICT tools is discussed in the following section.

4.8.2 Access, usage and usage gap in credit information through ICT tools

It is found that farmers have better accessibility to information through newspaper, telephone and television; computer, radio and farm magazines have less accessibility. In this section it is examined whether the farmers are actually using the information accessed through each of these ICT tools for their agricultural operations. The access, usage and usage gap of ICT tools are depicted in Table 4.37.

Table 4.38 Access, usage and usage gap in credit information using ICT tools

Sl. No	ICT tools	Marginal farmers			Small farmers			Large farmers			Total		
		Access	Usage	Gap	Access	Usage	Gap	Access	Usage	Gap	Access	Usage	Gap
1	Newspaper	25 (83.3)	7 (23.3)	18 [72.0]	30 (100)	12 (40.0)	18 [60]	29 (96.6)	9 (30.0)	19 [65.5]	84 (93.3)	28 (33.3)	55 [65.5]
2	Farm magazines	4 (13.3)	0 (0.0)	4 [100]	11 (36.7)	2 (6.7)	9 [81.8]	16 (53.3)	1 (3.3)	15 [93.5]	31 (34.4)	3 (3.3)	28 [90.3]
3	Radio	10 (33.3)	1 (3.3)	9 [90.0]	13 (43.3)	2 (2.2)	11 [84.6]	13 (43.3)	1 (3.3)	12 [92.3]	36 (40)	4 (4.4)	32 [88.9]
4	Television	27 (90.0)	1 (3.3)	26 [96.2]	29 (96.7)	0 (0.0)	29 [100]	29 (96.7)	0 (0.0)	29 [100]	85 (94.4)	1 (3.3)	84 [98.2]
5	Telephone	26 (86.7)	1 (3.3)	25 [96.2]	30 (100)	7 (23.3)	23 [76.7]	29 (96.7)	4 (13.3)	25 [86.2]	85 (94.4)	12 (13.3)	73 [81.1]
6	Computer & internet	4 (13.3)	0 (0)	4 [100]	5 (16.7)	0 (0)	5 [100]	9 (30)	1 (3.3)	8 [88.9]	18 (20.0)	1 (3.3)	17 [94.4]

Source: Compiled from primary data

Note : (i) Figures in simple bracket represent percentage share of each to category total

(ii) Figures in square brackets represent percentage of farmers not accessed to aware

It can be observed from Table 4.37 that credit information from all the ICT tools are not commonly used by the farmers in the study area. Compared to other ICT tools, newspaper and telephone have relatively low usage gap which implies that these are the most credible and useful source of credit information to the farmers. Among the ICT tools, television has highest access gap which shows that though local channels like moonlight are disseminating credit information to the farmer respondents and they have better accessibility to it, majority of them are not using it. Same pattern is found for farm magazines and radio. It has been observed that, in the case of credit information in particular, and financial transactions in general, respondent farmers have trust and confidence more in personal sources of information than from ICT tools. According to them, the most trustworthy and dependable source of credit information is fellow farmers, friends and relatives, farmer leaders, Secretary of Padasekharam, and officials of banks and financial institutions.

4.8.3 Purposes of usage of ICT tools for credit information

Farmers are accessing various types of credit information through ICT tools. It may be related to different types of credit facilities, their terms and conditions or information on existing or innovative financial services. It is essential to understand the purposes for which they are accessing ICT tools so that credit information related to that area can be provided more effectively and efficiently which will ultimately benefit the farmers. Purposes pointed out by the farmers are classified source - wise and presented in Table 4.38.

Table 4.38 Usage of ICT tools for credit information: Purpose - wise

Sl. No	Purpose	Marginal farmers	Small farmers	Large farmers	Total
1	**Newspaper**				
a)	Banking services	0	2	0	2 (7.1)
b)	Agricultural loans	7	7	5	19 (67.9)
c)	Financial news	0	3	4	7 (25.0)
	Total	7	12	9	28 (100)
2	**Farm Magazines**				
a)	All types of loans	0	0	2	2 (66.7)
b)	Bonus	0	1	0	1 (33.3)
	Total	0	0	2	3 (100)
3	**Radio**				
a)	Agricultural loans	1	2	0	3 (75.0)
b)	Banking services	0	0	1	1 (25.0)
	Total	1	2	1	4 (100)
4	**Television**				
a)	All types of loans	1	0	0	1 (100)
	Total	1	0	0	1 (100)
5	**Telephone**				
a)	Agricultural Loans	1	2	0	3 (25.0)
b)	Subsidy	0	5	4	9 (75.0)
	Total	1	7	4	12 (100)
6	**Computer and internet**				
a)	All types of loans	0	0	1	1 (100)
	Total	0	0	1	1 (100)

Source: Compiled from primary data
Note: Figures in simple bracket represent percentage share of each to total

It is clear from Table 4.38 that all the ICT tools are being used by farmers for obtaining information about different types of loans, either agricultural or consumption. Information on agricultural finance is accessed by the farmers primarily from newspaper and radio. These are two important ICT tools to disseminate credit information to the farmers. Telephone is used by most of the farmers to know about the various subsidies available through Direct Benefit Transfer Scheme.

4.8.4 Credibility of ICT tools for credit information

Use of an ICT tools for credit information depends on its credibility. If the tool is highly credible, it is used by the farmers most. For the purpose of measuring the credibility of ICT tools, they are rated using a five point scale and an index is developed using that scale. The credibility of various ICT tools used by the farmers for credit information is presented in Table 4.39.

Table 4.39 Credibility of ICT tools for credit information

Sl. No	Information sources	Index	Rank
1	Newspaper	31.1	1
2	Farm magazines	3.33	4
3	Radio	4.44	3
4	TV	1.11	5.5
5	Telephone	13.3	2
6	Computer and internet	1.11	5.5

Table 4.39 reveals that newspaper is the most credible ICT tool for credit information as indicated by the highest index. Since newspaper is the most highly credible source, the use of credit information from it is more among the respondent farmers as already found in Table 4.37. Least credible tools are computer and internet, and television followed by farm magazines. Farmers are not accessing credit information from agricultural portals and websites of banks since they lack technical skills in operating computer and internet. It is already found that majority of the farmers belong to the age group of above 55 years and above (Table 4.1).

In short, though farmers are partly aware of and have limited access to credit information disseminated through various ICT tools such as newspaper, farm magazines, radio, television, telephone and computers, many farmers are not using even the available credit information through ICT tools. Personal sources of credit information such as fellow farmers, friends and relatives, farmer leaders, Secretary of Padasekharam Samithi and bank officials are the trustworthy source of credit information to the farmers. ICT tools especially newspaper and radio are used by the farmers for getting information on different credit facilities including agriculture finance. The most credible source of credit information for the respondent farmers is newspaper followed by telephone whereas the least credible sources are internet and television. The use of credit information by the farmers depends primarily on the credibility of ICT tools used for accessing information.

4.9 Comparison of usage of ICT tools for marketing and credit information

While analyzing the extent of use of ICT tools for marketing and credit information, it is useful to examine how frequently ICT tools are used by the respondents to access marketing and credit information. Frequency of use was measured by means of usage index. For the purpose of construction of usage index,

frequency of use of ICT tools for marketing and credit information was rated on a five point scale and usage index was developed for each category of farmers. An overall usage index was also developed for both marketing and credit information. The comparison of the usage of ICT tools for marketing and credit information by different category of farmers is depicted in Table 4.40.

One way ANOVA test was performed to know whether there is any significant difference in frequency of usage of ICT tools among different category of farmers for marketing and credit information. The test is performed over usage index of each category of farmers, not on actual frequency. Also Pearson Correlation analysis was employed to identify whether socio- economic variables like education and annual farm income have any significant relation with the frequency of usage of ICT tools.

Table 4.40 Comparison of usage of ICT tools for getting marketing and credit information

Sl. No.	ICT Tool	Usage Index							
		Marketing Information				Credit Information			
		Marginal Farmer	Small Farmer	Large Farmer	Total	Marginal Farmer	Small Farmer	Large Farmer	Total
1	Newspaper	94.6	98.7	98.7??	96.8	37.3	46.7	42.7	42.3
2	Farm Magazine	25.3	36	41.3	34.2	20	21.3	21.3	20.9
3	Radio	28	32.7	40	33.6	20	24	20	21.3
4	TV	32	54	54.7	46.9	21.3	20	20	20.4
5	Telephone	20.7	29.3	27.3	25.8	20.7	29.3	27.3	25.8
6	Computer and internet	20	20	21.3	20.4	20	20	21.3	20.4
	ALL ICT Tools	44.2	48.9	49.5	47.5	23.3	27	25.4	25.2
One way ANOVA for marketing information: Sig. 0.041* (Newspaper), Sig. 0.006** (Farm magazines), Sig.0.001**(Telephone). One way ANOVA for credit information: Sig. 0.039* (Telephone)									
Pearson Correlation Coefficient with education for marketing information: Sig. 0.017** (Newspaper), Sig. 0.009** (Farm magazines) Pearson Correlation Coefficient with annual farm income for credit information: Sig. 0.045* (Television)									

** Significant at 1%
* Significant at 5%

It has been found from Table 4.40 that the most frequently used ICT tool for marketing and credit information is newspaper as evident from the highest overall usage index. This supports the findings of the study by Bachhav (2012) who found that newspaper is the major source of information to farmers in general. Newspaper is more used by the farmers for marketing information than for credit information. The

least used ICT tool for marketing and credit information is computer and internet which has got the least overall usage index. It is clear that the most favourite source of agricultural information to the farmers is newspaper. IT enabled initiatives has not reached the farmers to any considerable extent. Large farmers are more frequently using almost all ICT tools especially newspaper for marketing information since they have large scale cultivation and better accessibility to all ICT tools. Small farmers are the highest users of ICT tools for credit information. In general, farmers are using ICT tools more for marketing information (47.5%) than for credit information (25.2%).

The results of one way ANOVA is significant at one per cent level for farm magazines and telephone and five percent for newspaper which implies that there is significant difference in the frequency of use of newspaper, farm magazines and telephone among different category of farmers for marketing information. Chi Square test has already revealed that the access to information on newspaper and farm magazines are significantly related to category of farmers for both marketing and credit information. Small and large farmers are using these ICT tools more frequently than marginal farmers. Since small and large farmers are dominating in the higher annual family income brackets than marginal farmers (Table 4.1) these ICT tools are affordable to them. Significant difference in the frequency of use of telephone is also found among different category of farmers for credit information.

It is found that Pearson Correlation Coefficient for newspaper and farm magazines are significant at one percent level which implies that the use of newspaper and farm magazines for marketing information are significantly related to the education level of the respondent farmers. Pearson Correlation Coefficient for telephone is found to be significant at five per cent level which implies that the use of television for credit information is significantly related to farm income of the farmers.

4.10 Print and electronic media for agricultural information: Usage pattern of farmers

The analysis of the extent of use of ICT tools for obtaining marketing and credit information will be incomplete without a discussion about the specific item of print or electronic media which the farmer chooses from among the various newspapers, magazines and programmes meant for them in the market. Hence, the usage pattern of these specific items of print and electronic media among the farmer respondents is discussed in this section. Table 4.41 presents the subscription pattern of print media consisting of newspaper and farm magazines among the farmer respondents.

Table 4.41 Subscription pattern of print media among farmers

Sl No	Print media	Marginal farmers	Small farmers	Large farmers	Total
1	**Newspaper**				
a	Mathrubhumi	13	12	15	40(44.4)
b	Manorama	10	13	13	36(40.0)
c	Deshabimani	2	5	2	9(10)
d	Keralakaumudi	1	0	0	1(1.16)
	Total	26(30.23)	30(34.88)	30(34.88)	86(100)
2	**Farm magazines**				
a	Coconut Journal	1	1	1	3(9.68)
b	Karshakasree	5	3	6	14(45.13)
c	Kerakarshakan	1	3	6	10(32.3)
d	Rubber	0	0	1	1(3.23)

e	Kalpadenu	0	2	1	3(9.7)
	Total	7(22.6)	9(29.03)	15(48.38)	31(100)

Source: Compiled from primary data
Note: Figures in parenthesis represent percentage share of each to total farmers

Table 4.41 reveals that among newspapers, the highest subscription is for Mathrubhumi and the least for Keralakaumudi. Regarding farm magazines, Karshakasree is the most subscribed farm magazine followed by Kerakarshakan. As already seen, large farmers constitute major share in the total subscribers to farm magazines (48%).

Out of the various electronic media discussed in this study, radio and television, which are more common among farmers, and offering agricultural programmes to farmers are considered and are presented in Table 4.42.

Table 4.42 Agricultural programmes in electronic media: Usage pattern of farmers

Sl No	Electronic media	Marginal farmers	Small farmers	Large farmers	Total
1	**Television**				
A	Krishideepam	6	9	5	20(40.83)
B	Krishi dharshan	3	2	7	12(24.49)
C	Bhumi malayalam	1	1	1	3(6.12)
D	Farm news	0	2	2	4(8.16)
E	Harithakeralam	1	0	3	4(8.16)
F	Mannu	0	2	1	3(6.12)
G	Local channel	1	2	1	4(8.16)
H	Total	12	18	19	49(100)
2	**Radio**				
A	Vayalum veedum	2	5	3	10(55.6)

B	Farm news	2	2	4	8(44.4)
C	Total	4	7	7	18(100)

Source: Compiled from primary data
Note: Figures in parenthesis represent percentage share of each to total farmers

Table 4.42 shows that the most popular agricultural programme in the television is Krishideepam of Asianet followed by Krishidharshan of Doordarshan. 'Moonlight', the local channel is also providing information to the farmers. Agricultural programmes on television are mostly accessed by small and large farmers. Regarding radio, the most popular agricultural programme is Vayalum Veedum (59 %,) the age old programme of All India Radio.

4.11 Constraints in using Information and Communication Technology tools

The third and last objective of the study is to analyse the constraints in using ICT tools by the farmers so as to enable policymakers to design strategies for effective use of these tools for agricultural information dissemination. The constraints pointed out by the farmers have been classified source - wise and percentage analysis has been adopted to examine the gravity of the constraints associated with each of the ICT tools and is depicted in Table 4.43.

Table 4.43 Constraints of farmers in using ICT tools: Source - wise

Sl. No.	Constraints	No. of farmers	Percentage
A	**Newspaper**		
1	Lack of time to read and comprehend	47	60.3
2	Personal impediments	20	25.6
3	Ignorance to comprehend the information	7	9.0
4	No access to the newspaper	4	5.1
	Total	78	100
1	Not needed for their farm operations	35	30.4

2	Lack of time to read	27	23.5
2	Poor access to the magazines	20	17.4
4	Cost of subscription	13	11.3
5	Availability of alternative sources	12	10.4
6	Personal impediments	8	7.0
	Total	**115**	**100**
C	**Radio**		
1	Availability of alternative sources	56	66.7
2	Lack of time	15	17.8
3	No access to radio .	9	10.7
4	Broadcasting time is not suitable	4	4.8
	Total	**84**	**100**
D	**Television**		
1	No enough time to watch TV	59	60.9
2	Telecasting time is not suitable	30	30.8
3	Not interested	3	3.1
4	Not needed	3	3.1
5	Problem in telecasting	2	2.1
	Total	**97**	**100**
E	**Telephone**		
1	Lack of awareness	34	34.0
2	Lack of technical skill	20	20.0
3	Limited information	20	20.0
4	Not needed	12	12.0
5	No effective information	7	7.0
6	Difficulty in connection	5	5.0

7	Cost of the technology	2	2.0
	Total	**100**	**100**
F	**Computer and internet**		
1	Lack of technical skill	58	49.2
2	Lack of awareness	26	22.0
3	Not needed	14	11.9
4	Poor access	11	9.3
5	Lack of time	5	4.2
6	Cost of technology	2	1.7
7	Lack of updated information	2	1.7
	Total	**118**	**100**

Source: Compiled from primary data

Lack of time to read and comprehend is the major constraint pointed out by the farmers of the study area with respect to newspapers although they attribute the quality of accuracy to this source. Since farmers have to fully involve in farming operations throughout the day, they are not getting enough free time to read newspaper during day time. They get time either early in the morning or late at night, which is also very less. Personal impediments are another constraint faced by the farmers since majority of the farmers belong to the age category of above 55 years. It is also seen that youth are not interested in the profession of agriculture (Table 4.1). In order to disseminate information effectively and to comprehend easily without waste of time, it is essential to provide the relevant information in a capsule form to the farmers.

According to the farmers, farm magazines do not contain the information required by them and cannot improve their farming operations. Lack of time to read the farm magazines, as in the case of newspapers is another impediment. In the opinion of the farmers, though institutions like Coconut Development Board, VFPCK

and Kerala Agricultural University have taken initiatives to make the farmers subscribe to their publications, they never monitor whether the information delivered through these magazines are relevant and beneficial to the farmers and whether the farmers can access and use the information easily and without loss of time. Moreover, the volume of agricultural operations of the farmers has considerably got reduced and hence do not require information for large scale cultivation, as usually published through farm magazines.

In the case of radio, the major constraint in the use is the availability of alternative sources like television. Though many of the respondents possess radio, they are not using it because of the increasing popularity of television. Radio has become outdated among the farmer respondents. But there is a small section of respondents who have the regular listening habit of radio for agricultural information. Lack of time is another major hindrance pointed out by many of the respondents. Sometimes farmers do not know in advance about the telecast of a particular programme, though the radio channel has announced it earlier. Once farmers miss the programme relevant to them because of their time constraints, they cannot get access to that particular programme again. Farmers are not in the habit of making enquiry about the content of radio programmes on agriculture, even if they have genuine doubts.

After lack of time, as in the case of other sources of information, the next constraint reported is the unsuitable time of telecast of television. Most of the programmes are telecasted at a time when the farmers are in the field. So they have suggested that programmes meant for the farmers should be telecasted after 6 pm. Mishra (2008) also reported that lack of time is one of the major factors responsible for less utilization of mass media by the farmers. Some of the farmers are watching agricultural programme not intentionally, but by chance when they change the channel. Farmers are interested only in those programmes which are directly related to their needs and situation. They also make queries to the channel regarding doubts

of a programme telecasted in a limited scale. Television channels which are telecasting agricultural programme should make the agricultural programmes a little more attractive in order to highlight it over other television programmes.

Lack of awareness is the major constraint identified by the farmers in the case of telephone. Majority of farmers are not aware about Kisan Call Centre, IFFCO agri message service etc. Not even a single respondent has made use of these services. Moreover the farmers, most of whom are aged do find it difficult to use mobile phone for collecting agricultural information due to lack of technical skill. Also only limited information is available through mobile phones. Creation of awareness regarding these services and training programmes at the grass root level with respect to imparting the skill for operation of mobile phone in accordance with the service provider can only enable the farmers to make use of this ICT tool. Market Intelligence Cell of KAU in collaboration with IFFCO are providing agri SMS services to the farmers. Agromet Advisory Services prepared by the Department of Agricultural Meteorology, College of Horticulture, Kerala Agricultural University, and the Department of Agriculture, Government of Kerala are also available to the farmers through mobile phone.

It is reported that 64 percent of the farmers are facing the constraint of lack of technical skill in the use of computer and internet. It is already seen that 62 per cent of the respondent farmers are above 55 years (Table 4.1). Majority of the farmers have no computer and many of those who have computer have no internet facility at their homes. As a result, in order to avail information from computer and internet, farmers have to depend on other skilled persons. Lack of awareness about agricultural portals and their facilities is another important limitation in the use of this ICT tool among farmers. Computer education and capacity building to the farmers in general is essential along with making awareness about different electronic journals, agricultural portals and all other electronic sources which the farmer can access for information.

Also authorities have to provide infrastructural facilities at a fair price to the farmers. VFPCK officials are making available information on prices of commodities to the farmers after browsing the internet, when the farmers approach them. Help desks or help centres may be provided at the panchayat level for enabling the farmers to use the available information at the initiative of local self governments or Krishi Bhavan or service provider.

Lack of time is the major constraint pointed out by farmers for the sources like newspaper, radio and television. The farmers do not prefer farm magazines since the content is of no use to them in most cases. Broadcasting time is not suitable to the farmers in the case of television and radio. Lack of awareness on different services provided through telephone and internet, and technical incompetency to operate mobile phones and computer by the farmers are major impediments in the use of ICT tools.

The last part of the Results and Discussion chapter is devoted for an understanding about the Market Information System of VFPCK, one of initiatives of the Government of Kerala to bring an overall development of the fruit and vegetable sector in India. Even though this is not included in the objectives of the study, it is part of the technical programme of the study.

4.12 Market Information System of Vegetable and Fruit Promotion Council Keralam (VFPCK)

In agriculture, crop diversification helps in minimizing risks, enhancing farm income, generating employment and improving land quality. In India, Government is promoting cultivation of horticultural crops as a part of overall strategy towards crop diversification. In the case of horticultural crop, production and marketing is hampered by small holdings, low volume, absence of cold storage, poor infrastructure etc.

More than growing, it is while marketing the produce that a farmer faces a lot of problems and difficulties. The irony is that the profit of the produce does not benefit the grower nor the consumer but the middlemen. The risks associated with the marketing of horticultural crops make the setting up of agricultural marketing information system one of the priority areas of the Government of Kerala. Market information systems otherwise known as market intelligence systems or market information services or MIS are information systems used in gathering, analysing and disseminating information about prices and other information relevant to farmers, animal rearers, traders, processors and others involved in handling agricultural products. Market information systems play an important role in agro-industrialisation and food supply chains. With the advancement of ICTs in developing countries, the income- generation opportunities offered by market information systems have been sought by international development organizations and businesses alike.

Access to reliable and up to date market information through market information system especially critical for future growth of agriculture in India. Market price is an important information need of the farmers. The Kerala Government, realising the seriousness of the issue, formed the VFPCK to help farmers market the produce themselves. The Council developed a new group marketing system that is production - centred and farmer-participatory. Farmers in different villages all through the State of Kerala are formed into self-help groups called Swasraya Karshaka Samithi (SKS) or farmers' market.

For the purpose of studying the Market Information System of VFPCK, a visit was made to Thanippadam Swasraya Karshaka Samithi, in Thrissur. Besides this, the website of VFPCK was observed. The observations as per the website and from the discussions with the Master Farmers/ Executive Committee members and some of the staff are briefed in the following section, after which the opinions of farmers about the Marketing Information System of VFPCK during the course of the study are presented.

4.12.1 Structure of VFPCK

VFPCK has been established to bring about overall development of fruit and vegetable sector in Kerala. It was established in 2001 as the successor organization of Kerala Horticulture Development Programme (KHDP). VFPCK is a company with majority stake of farmers, the Government of Kerala and financial institutions as the other major shareholders. Self Help Groups of farmers constitute 50 per cent of shares, Government of Kerala has 30 per cent and other related institutions hold 20 per cent of VFPCK's shares. The primary objective of the Council is to improve the livelihood of vegetable and fruit farmers by empowering them to carry on vegetable and fruit production, value addition and marketing as a profitable venture in a sustainable way. It also aims to continue the successful activities initiated by Kerala Horticulture Development Programme. The Council aims to attain the objectives through the principle of "Self Help, Participation and Prosperity".

In Kerala, the farmers have limited financing option and practiced inefficient farming due to poor training, lacked bargaining power because of disorderly production, and did not have the know-how to market their own products. These are the major reasons for the formation VFPCK. The Council's key activities center around four areas - production, training, credit provision and marketing. Of these particular interest is given to its marketing activities.

VFPCK has a decentralized organizational structure with the headquarters in Kakkanad, Kochi. There are district managers in each district and field/assistant managers at each farmer's market. At the head office, the Council employs data collectors for its market information centre. These data collectors collect market information like price and market details of vegetables and fruits from the identified markets in each district and publish in their official website daily.

4.12.2 Marketing operation of VFPCK

The combination of a well-organised and monitored group structure, as well as production, training, and credit supports provided has culminated in a successful forward linking market strategy consisting of number of farmers' markets.

4.12.2.1 Organisation of farmers' market

The crucial problems faced by vegetable and fruit farmers are lack of bargaining power to earn good prices for their produce in the market, the power and control of trader on the pricing policy, the substantial time taken for marketing activities and lack of storage facilities. To overcome these issues and bringing marketing processes closer to the production centre so that farmers gain greater price realisation for their products, VFPCK has developed a unique group marketing structure. Through this structure farmers have taken control of the marketing process and fully participate in it. In effect, instead of farmers having to travel to traders, traders must now travel to the farmers.

When SHGs reach the stage where they are ready and willing to take on marketing as a key initiative for their groups, the Council supports the formation of societies, whereby 7-15 SHGs are linked together to run a farmers' market. Three farmer leaders called Master Farmers (MFs) are selected in each SHG and are trained for leading each group. In VFPCK, the dissemination of information is routed through Master Farmers. They lead farmers in the areas of production, credit and marketing.

The Master Farmers of each society act as the Executive Committee of these societies, and a President, Vice President, and the Treasurer are selected from this Committee to serve a two - year term for the society. The Executive Committee is expected to establish a procurement and marketing plan, identify and build relationship with local leaders, and plan other logistical details needed to establish a market place. The market sites are identified and established at a point closer to the location of production.

4.12.2.2 Marketing Process

The Council has developed an innovative and transparent auction process employed twice a week by each society. Here, the local wholesale traders meet at the farmers' market site managed by the farmers to buy the produce from the source in a process that ensure a fair price and payment to farmers.

Each farmer that participates in the auction process brings his produce in lots directly to the site, usually using transportation arranged by the SHG themselves. Lots are graded and organised by quality and marked with a pink slip stating farmer's name and starting bid. Members of the society's marketing executive committee run and document the auction in front of the farmer of each lot and prices are quoted per kilogram based on information received from the Market Intelligence Centre.

Auction occur on the basis of one crop at a time, and soon after each lot is sold, the lot is brought to the weighing station and total trade price is calculated. Lots are weighed in the presence of the farmer, the trader and one of the VFPCK district managers, ensuring that the trader does not quote a lesser weight, a tactic typical of other markets. After the auction is complete, the trader will bring their own vehicle, thus saving the farmer from prohibitive transportation costs to reach markets. Any surplus produce is brought and sold at the nearest wholesale market by one of the executive committee members.

4.12.2.3 Market Information Centre - Pricing

VFPCK runs a marketing information centre, where pricing information is collected daily from major markets in and around Kerala by the data collectors employed by the Council and communicate it to the societies' marketing executive committees for use during auction through the official website of VFPCK or through phone. In the website, there is a section called Market Information Centre (MIC), from where the societies can collect market information.

MIC is envisaged for creating an information system that will provide vital market information to the fruit and vegetable farmers and to the horticulture sector as a whole. MIC is well equipped to meet the rising needs of different customers in this sector. It is a reliable data bank of market data in fruit and vegetable sector. The MIC data is used as a base for fixing price in the farmers' market. The MIC at VFPCK headquarters collects market data of vegetables and fruits on a daily basis from 16 wholesale markets in Kerala and also from four other States. Data collected from various sources over the years will be analysed to generate reports for various purposes. The reports will be sent to newspapers, All India Radio, Farmers' Markets (Swasraya Karshaka Samithi) and other agencies on a daily basis.

The major crop marketing through VFPCK is banana. The price of the crop varies daily and VFPCK keeps a check on it. When farmers bring in their banana bunches, VFPCK pays them 90 per cent of the cost immediately. The Council has empowered the farmers to get a better price for their produce. Bargaining power of the farmer has increased. It is free of political interference also.

4.12.3 VFPCK: Farmer's point of view

While analysing the various channels of marketing for the farmer respondents of the study, it was found that farmers' market consisting of VFPCK and Farmers' Clubs is one among them, the others being SUPPLYCO for paddy, Krishi Bhavan for coconut, PACS, private traders and open market. (Table 4.9). According to the farmers, farmers' market including VFPCK is actually a traders' market. The prices are determined not purely based on the auction. There is an unlawful understanding between the traders not to bid exceeding a particular amount for each crop in the auction, which is very low compared to the market rate. Hence traders determine the prices. Mostly perishable products like, banana and vegetables are dealt in the farmers' market and hence farmers have no bargaining power and have to oblige to the prices decided by the traders leading to distress sales. After deducting the

commission of the market, from the already low prices offered, the returns are not remunerative according to the farmers. Hence farmers supply to this market only due to urgency of sale arising from the perishability nature of the produce. Instances have been quoted where farmers leave the market in tears, cursing the traders and the present system of farmers' market. In short as far as the respondent farmers of the study area are concerned, farmers' market is another platform for exploitation of the farmers by the middlemen. The objective of the Government of Kerala to eliminate the evils of middlemen through farmers' market still remains unsolved.

4.13 Suggestions for effective use of ICT in agriculture information

From the analysis of the overall agricultural information needs of farmers with special reference to marketing and credit information, it is understood that farmers need information on certain important areas. The level of awareness, access and usage of ICT tools, especially modern ones, is limited among farmers due to certain constraints. Hence, certain suggestions for improving the effective and efficient use of ICT for imparting agriculture information to farmers which have been deduced from the study are discussed in the subsequent paragraphs

Different central and state government schemes are available for farmers. Since farmers lack awareness about these schemes and their highest agricultural information need is about government schemes, it is suggested that the Department of Agriculture, Government of Kerala may take necessary steps to conduct awareness programmes and seminars about the details of the government schemes through Krishi Bhavan as and when schemes are announced.

The system of linking of credit with marketing prevents the farmers to sell their produce through PACS. Farmers may be educated about the need to make prompt repayment of their loans. The society should ensure reasonable price for the produce of the farmers also. There is no subsidy available for inputs purchased through PACS in the study area. This will gradually keep the farmers away from co-

operative society. Hence it is suggested that the schemes of subsidy for inputs available elsewhere may be made applicable to PACS also.

The analysis of marketing information needs shows that results of market research have not reached the farmers. Sensitisation programmes at the initiative of local self governments and institutions involved in research are highly essential so that the findings of the market research reach the farmers.

Lack of time to read and comprehend is the major constraint pointed out by the farmers of the study area with respect to newspapers. Since farmers have to fully involve in farming operations throughout the day, they are not getting enough free time to read newspaper during day time. It is suggested that inorder to disseminate information effectively and to comprehend easily without waste of time, the relevant information may be published in a capsule form to the farmers through newspapers.

In the opinion of the farmers, though institutions like Coconut Development Board, VFPCK and Kerala Agricultural University have taken initiatives to make farmers subscribe to their publications, they never monitor whether the information delivered through these magazines are relevant and beneficial to the farmers and whether the farmers can access and use the information easily and without loss of time. It is essential from the part of these institutions, to ensure that the information provided through farm magazines are relevant and adequate to the farmers.

With regard to television, since the popularity of other programmes are increasing day by day, it is suggested that television channels which are telecasting agricultural programme should make the agricultural programmes a little more attractive in order to highlight it over other television programmes. .

Lack of awareness is the major constraint identified by the farmers in the case of telephone. Majority of farmers are not aware about Kisan Call Centre, IFFCO agri message service and the mobile based services provided by KAU. Moreover the farmers, most of whom are aged do find it difficult to use mobile phone for collecting agricultural information due to lack of technical skill. Hence awareness may be

created among farmers regarding the services offered and training programmes for imparting the skill for operation of mobile phone in accordance with the service provider. Kerala Agricultural University may take special attention in creating awareness among the farmers about the web - based services offered by it to the farmers, and through mobile phone.

It has been noticed that lack of technical skill is the major constraint in the use of computer and internet. Lack of awareness about agricultural portals and their facilities is another important limitation in the use of this ICT tool among farmers. Computer education and capacity building to the farmers in general is essential along with making awareness about different electronic journals, agricultural portals and all other electronic sources which the farmer can access for information.

As far as credit information is concerned, banks may send messages to farmers regarding due date of loans, new schemes and facilities and insurance schemes as being done now in the case of deposits and withdrawals.

With a view to eliminating the middlemen and ensure better returns for the farmers, the Government of Kerala introduced Farmers' Market called Farmers'' Clubs and VFPCK. But according to the farmers, 'farmers' market' is actually a 'traders' market. Hence government intervention in the market may be made effective so as to prevent distress sale by farmers.

Telephone is possessed by all the respondent farmers. So if the farmers are trained well in using mobile phones for accessing information, they will be able to know the current market prices, which will enable them to take a correct decision before taking the produce to the market. Farmers' market becomes a traders' market since this information is not available at the right time.

One of the major problems associated with the use of modern ICT tools by farmers is with respect to the level of technical competency of the farmers to use these tools. Agriculture as a profession is looked down by the society. Younger

generation is not attracted to this profession and hence the volume of agricultural operations is coming down day by day, especially in Kerala. The adoption of modern ICT tools by the farmers is very less since the farmers do not have awareness, even if they have awareness they do not have access. Even in the case of those who have access, most of them do not know how to use it. If the present generation of farmers who is actively involved in agriculture, i.e., those who are above 55 years of age, retire from their work, a major portion of the agricultural land will remain unutilized or they will be converted into dwelling places or industrial areas. Out of the ninety farmers respondents of the study, only one was below the age of 35. More than 62 per cent of the farmers are above the age of 55. This is a clear indication of the disinterest or indifference of the younger generation in undertaking farming as a profession., especially in Kerala. Adoption ICT tools for obtaining information about farming activities including marketing and credit information, along with mechanisation of farm operations, can definitely attract the younger generation to agriculture and ensure food security for the people.

SUMMARY & CONCLUSION

CHAPTER 5

SUMMARY OF FINDINGS AND CONCLUSION

Knowledge management can play a pivotal role in enhancing agricultural productivity and addressing the problem of food insecurity. It is considered as the fourth production factor after labour, land and capital and is particularly critical in the agricultural sector. Making relevant knowledge accessible to the farming community helps improve production and productivity, and brings higher returns. If the agricultural practice of farmers is not backed up by modern agricultural knowledge and information, agricultural households are likely to remain trapped in low productivity, food insecurity and poverty. ICT can play a crucial role in benefiting the resource - strapped farmers with upto date knowledge and information on agricultural technologies, best practices, markets, price trends, and weather conditions. The experiences of most countries indicate that rapid development of ICT, which facilitates the flow of data and information, has tremendously enhanced the knowledge management practice in agriculture.

The study on 'Marketing and credit information to farmers: Role of Information and Communication Technology' has been undertaken with the objectives of identifying the information needs of farmers in Thrissur district with respect to marketing and credit; studying the extent of use of Information and Communication Technology by the farmers for getting these information and analysing the constraints in the use of ICT by the farmers.

The study has been fundamentally based on primary data. The sample size of the study was 90 respondents, consisting of 30 each from three Panchayats of Thrissur district viz., Pananchery, Mattathur, and Varantharapilly which were selected by stratified purposive sampling method. Data were collected through pre-tested structured interview schedule.

Chi-Square test, One way ANOVA, Pearson's Correlation Coefficient and indices such as information index, usage index, overall usage index and credibility index were employed to analyse the data. Household location, sources of agricultural credit and market location of the selected respondents in the sample panchayats were plotted using GIS.

5.1 Major findings

The major findings of the study are summarised and presented in the sequence given below.

5.1.1 Information and Communication Technology in agriculture: Initiatives and tools

5.1.2 Marketing and credit information needs of farmers

5.1.3 Extent of use of ICT tools

5.1.4 Constraints in using ICT tools

5.1.1 Information and Communication Technology in agriculture: Initiatives and tools

ICT initiatives and tools in agriculture are presented as ICT initiatives across the world, in India, and in Kerala. Farm Radio International and Farmer Voice Radio in Africa, Rural and Agricultural Development Communication Network (RADCON) in Egypt, Agricultural Commodity Exchanges in Kenya and Bolivia are major ICT initiatives across the world.

The ICT initiatives at the national level are organised as internet enabled computer centres, agricultural web portals, initiatives through telephone, agricultural

information broadcast and telecast through radio and television and agricultural information dissemination through farm magazines and newspapers. The popular internet enabled centres include central government initiatives such as Village Resource Centres, Village Knowledge Centres, Community Information Centres, Common Service Centres, Warana Wired Village Project, online information system of commodity exchanges and Karnataka state government initiaitve Bhoomi. Along with this, private initiative e-Choupal is also functioning in India to offer farmers up-to-date marketing and agricultural information. The important agricultural web portals available to the farmers at national level include AGMARKNET, Agropedia, Agricultural Resource Information System (AgRIS), aAQUA, AGRISNET, IFFCO Agri-Portal, Agriwatch portal, iKisan Project, e-Sagu, Gyandoot Project etc.

The major initiatives at the national level for delivering agricultural information to farmers using telephone consist of *Kisan Call Center (KCC)*, LifeLines India, IFFCO Kisan Sanchar Limited (IKSL), TATA m- Krishi, and Reuters Market Light (RML). Farm and Home broadcasts of All India Radio, and Community Radio Services by Krishi Vigyan Kendras are the foremost agricultural broadcasts through radio. The major agricultural programme in television is Krishidharshan of Doordarshan channel. Farm journalism plays vital role in modernizing Indian agriculture. "Kurukshetra" and "Yojana" magazines are being published by Government of India on rural aspects, the State Agricultural Universities are publishing their own farm magazines, and the ICAR is publishing the farm magazines like Indian Farming and Indian Horticulture.

In Kerala, farm page is appearing in Malayalam newspapers on a regular and planned pattern. The widely circulating farm magazines in Malayalam are Kerala Karshakan (FIB), Karshakasree (Malayala Manorma), Karshakan (Deepika), Rubber (Rubber Board), Indian Nalikera Journal (Coconut Development Board), Spice India (Spices Board), Kannimannu (Kerala State Agricultural Officers Association) and

Vasudha (Rajan Eramallikkara). The most popular agricultural programmes in the radio are Farm and Home programme and Krishi Padam and Farm School broadcasted by All India Radio. The popular agricultural programmes on the television include Krishideepam (Asianet), Harithabaratham (Amritha), Harithakeralam (Jeevan), Bhoomi Malayalam (Surya), Mannu (Reporter) and agricultural programmes in several local channels. Agricultural extension system uses telephone in disseminating information through Kisan Call Centers, SMS-based extension services, and IFFCO Kisan Sanchar Ltd. (IKSL). Two main websites from agriculture department are e-krishi.org and kissankerala.net.

5.1.2 Marketing and credit information needs of farmers

In Thrissur district, both males and females are engaged in farming operation and majority of them (94%) are males. More than sixty per cent of the farmers have an age exceeding 55 years and only one farmer falls in the category of less than 35 years which implies that the new generation is keeping away from farm operations. There are no illiterate respondents in the study area and maximum number of persons has attained secondary education. All the respondents have the ability to read or write and the level of education attainment is sufficient to support adoption of technology. With regard to the occupation of sample respondents, primary occupation of 82 per cent of the respondents is agriculture where as the rest 18 per cent are doing agriculture as subsidiary occupation. Annual income from agriculture for half of the respondents is up to Rs. 50000 and income from agriculture of the respondents varies according to the land holding size. As far as agricultural production in monetary terms is concerned, a major portion (43%) of the farmers fall in the category of upto Rs 1, 00,000 per annum and most of them are marginal and small farmers.

The major crops cultivated by the farmers in the order of priority include paddy, coconut, banana, rubber, nutmeg and arecanut. Major cultivators of banana, coconut, and rubber are large farmers whereas paddy and intercrops such as nutmeg

and arecanut are cultivated mainly by small and marginal farmers. More than half of the respondents are getting more than 50 per cent of their total income from agriculture.

Forty two per cent of the farmers have not taken any agricultural loans, neither from institutional nor non-institutional sources and rest 58 percent of farmers have access only to institutional sources of credit. None of the respondent farmers have availed loans from non – institutional agencies like money lenders. Primary Agricultural Credit Societies (PACS) are the major institutional agency which provide finance support to the farmers from which more than 48 per cent of the farmers have availed loans. Agricultural loans provided by PACS and public sector banks are in the form of Kisan Credit Card (KCC) limit and agricultural gold loan under interest subvention scheme and agricultural loans under Differential Rate of Interest (DRI) loans.

With regard to the purchase of inputs, Krishi Bhavan is the first choice of majority of the farmers (78%) since they are getting inputs at different subsidy rates under different schemes based on criteria such as size of landholdings, number of crops etc. Co-operative society is the least preferred source by all categories of farmers because of lack of subsidy for inputs. Marketing channel for more than 50 percent of farmers are private traders since they get the price on spot and they will collect the produce at the doorstep of the farmer. Farmers supply their produce to farmers' market due to urgency of sale arising from the perishability nature of the produce. Farmers have to sell their produce at lower price since farmers' market is actually trader's market and they have no bargaining power and have to oblige to the prices decided by the traders leading to distress sales.

In farm management, the decisions are guided by information. Farmers are therefore engaged in information search in order to fill the information gap and to

satisfy their goals. Agricultural information refers to all published and unpublished knowledge on general aspects of agriculture and consists of innovations, ideas, and technological practices. The overall agriculture information needs of the farmers are identified and classified into information regarding production, post-harvest techniques, market, credit, agricultural insurance, government schemes and labour. The most needed agricultural information by the respondent farmers is about government schemes followed by market information. Farmers are unaware about most of the government schemes for them. In agricultural operations, the information gap is zero in production and market information which indicate that these are the two important agriculture information, farmers accessing regularly. At the same time, the information gap is 100 percent for labour in which the awareness is the lowest. Labour scarcity is not a severe problem in the study area.

Farmer's market information needs are those that enable him to make rational and relevant decisions. Day to day market trend of different variety of crops is necessary for the farmers to ensure reasonable price for their produce. Marketing information needs of the farmers were identified and classified into nine categories, viz, information needs on input supply, market profile, grades and standards, market research studies, market trend, export market, improved marketing practices, warehouse facilities and futures trading. The most needed marketing information is about market trend and the least needed are on export markets, futures trading and market research. The market information gap is zero for input supply and market trend implying that farmers have more access to these marketing information. Gap is high for information on improved marketing practices, futures trading and export markets since farmers rely on traditional method of marketing.

5.1.3 Extent of use of ICT tools for marketing and credit information

Accurate and timely market information can make positive benefits to farmers. Upto date, current market price enable the farmers to carry out transaction with traders from a position of greater strength.

Farmers have better accessibility to information through newspaper, telephone and television since more than 90 per cent of farmers are aware of and have access to marketing information through newspaper, telephone and television. Computer, radio and farm magazines have less accessibility. Majority of farmers (97.8%) are aware about the availability of marketing information on computer and internet, but a few of them only (20%) have access to it. Farmers lack technical skills for operating computers and most of the marginal and small farmers have no computer facility with internet connectivity at home. Poor access to farm magazines is the major cause for access gap with respect to farm magazines.

Usage gap as the difference between access and actual use is zero for newspaper in the case of marketing information. But the usage gap is the highest in the case of computer and internet. As far as farm magazines are concerned, the usage gap is less because the access of the farmers to this tool is very limited. Newspaper is still the main source of marketing information to the farmers. It is cheaper than other sources, can be accessed at their convenience and can be stored, unlike information through radio and television.

Information on current market price is the most important market information for farmers since it has direct relation with profitability of farmers. Most credible source of marketing information among the ICT tools used by the farmer respondents is newspaper and the least credible ICT tool is computer and internet followed by radio.

All the farmers are aware of credit information available through ICT tools and newspaper is accessed by majority of farmers except four marginal farmers for getting credit information. Similar to marketing information, the most popular and

credible source of credit information to the farmers is newspaper. Followed by newspaper, television and telephone are used by the farmers to access credit information especially small and large farmers. As in the case of marketing information, computer and internet are least accessed by the farmers for credit information since they do not know how to search and retrieve information from internet. Though farmers are aware of agriculture portals and websites of banks and financial institution, none of them are accessing credit information from these sources. Since most of the respondent farmers belong to the old age category, the use of computer and internet is limited among respondents. For the respondent farmers, personal source of credit information is more trustworthy and reliable than credit information from ICT tools.

With regard to the usage gap, credit information from all the ICT tools are not commonly used by the farmers. Compared to other ICT tools, newspaper and telephone are the most credible and useful source of credit information to the farmers. In the case of credit information in particular, and financial transactions in general, respondent farmers have trust and confidence more in personal sources of information than from ICT tools

5.1.4 Constraints in using ICT tools

The third and last objective of the study is to analyse the constraints in using ICT tools by the farmers so as to enable policymakers to design strategies for effective use of these tools for agricultural information dissemination. The constraints pointed out by the farmers have been classified source - wise and percentage analysis has been adopted to examine the gravity of the constraints associated with each of the ICT tools.

Lack of time to read and comprehend is the major constraint pointed out by the farmers of with respect to newspapers. Personal impediments are another constraint faced by the farmers since majority of the farmers belong to the age category of

above 55 years. In order to disseminate information effectively and to comprehend easily without waste of time, it is essential to provide the relevant information in a capsule form to the farmers.

According to the farmers, farm magazines do not contain the information required by them and cannot improve their farming operations. Lack of time to read the farm magazines, as in the case of newspapers is another impediment. Moreover the volume of agricultural operations of the farmers has considerably got reduced and hence do not require information for large scale cultivation, as usually published through farm magazines.

In the case of radio, the major constraint in the use is the availability of alternative sources like television. Though many of the respondents possess radio, they are not using it because of the increasing popularity of television. Radio has become outdated among the farmer respondents. Lack of time is another major hindrance pointed out by many of the respondents. Farmers are not in the habit of making enquiry about the content of radio programmes on agriculture, even if they have genuine doubts.

Major constraint reported is the unsuitable time of telecast of television. Most of the programmes are telecasted at a time when the farmers are in the field. So they have suggested that programmes meant for the farmers should be telecasted after 6 pm. Some of the farmers are watching agricultural programmes not intentionally, but by chance when they change the channel. Farmers are interested only in those programmes which are directly related to their needs and situation. They also make queries to the channel regarding doubts of a programme telecasted in a limited scale.

Lack of awareness is the major constraint identified by the farmers in the case of telephone. Majority of farmers are not aware about Kisan Call Centre, IFFCO

agri message service etc. Not even a single respondent has made use of these services. Moreover the farmers, most of them are aged do find it difficult to use mobile phone for collecting agricultural information due to lack of technical skill. Also only limited information is available through mobile phones. Creation of awareness regarding these services and training programmes at the grass root level with respect to imparting the skill for operation of mobile phone in accordance with the service provider can only enable the farmers to make use of this ICT tool.

It is reported that 64 percent of the farmers are facing the constraint of lack of technical skill in the use of computer and internet. 62 per cent of the respondent farmers are above 55 years. Majority of the farmers have no computer and many of those who have computer have no internet facility at their homes. As a result, in order to avail information from computer and internet, farmers have to depend on other skilled persons. Lack of awareness about agricultural portals and their facilities is another important limitation in the use of this ICT tool among farmers. Computer education and capacity building to the farmers in general is essential along with making awareness about different electronic journals, agricultural portals and all other electronic sources which the farmer can access for information. Also authorities have to provide infrastructural facilities at a fair price to the farmers.

From farmers' point of view, farmers' market including VFPCK is actually a traders' market. The prices are determined not purely based on the auction. There is an unlawful understanding between the traders not to bid exceeding a particular amount for each crop in the auction, which is very low compared to the market rate. Mostly perishable products like, banana and vegetables are dealt in the farmers' market and hence farmers have no bargaining power and have to oblige to the prices decided by the traders leading to distress sales. After deducting the commission of the market, from the already low prices offered, the returns are not remunerative according to the farmers.

5.2 Conclusion

Information and Communication Technology tools are an effective way to disseminate agricultural information particularly marketing and credit related information. Among the ICT tools, print media especially newspaper is popular among farmers whereas modern ICT tools like mobile phone, computer and internet are not trendy among farmers. A small portion of farmer community is actually using agricultural information especially about current market price and agricultural loan from ICT tools mainly newspaper. All the ICT tools are actively disseminating agricultural information. The problem is with regard to the end users. Farmers are reducing concentration on farming and move on to other occupation because of non profitability of the farming operations. In this context, farmers are not requiring information disseminated through ICT tools for small scale cultivation. Also new generation who has the skill to operate modern ICT tools are keeping away from farming operations. Hence, concerned authorities should take necessary steps to make the farmers, withstand in agricultural operations and attract youth to the profession.

MARKETING AND CREDIT INFORMATION TO FARMERS: ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY

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ABSTRACT OF THE THESIS

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ABSTRACT

Knowledge management can play a pivotal role in enhancing agricultural productivity and addressing the problem of food insecurity. If properly managed, it enables appropriate knowledge and information to reach the knowledge intermediaries and farmers in a timely manner. ICT can play a crucial role in benefiting the resource - strapped farmers with upto date knowledge and information on agricultural technologies, best practices, markets, price trends, and weather conditions.

The study on 'Marketing and credit information to farmers: Role of Information and Communication Technology' has been undertaken with the objectives of identifying the information needs of farmers in Thrissur district with respect to marketing and credit; studying the extent of use of Information and Communication Technology (ICT) by the farmers for getting these information and analysing the constraints in the use of ICT by the farmers.

Ninety respondent farmers from three panchayaths of Thrissur district viz., Pananchery, Mattathur, and Varantharapilly were selected as sample size through stratified purposive sampling method. Data were collected through pre-tested structured interview schedule. The major statistical tools used for the study were Chi-Square test, ANOVA, Pearson's Correlation Coefficient and indices such as information index, usage index, overall usage index and credibility index. The location of the selected respondents in the sample panchayats were plotted using Geographic Information System (GIS).

Forty two per cent of the farmers have not taken any agricultural loans, neither from institutional or non-institutional sources and rest 58 percent of farmers have access to only institutional sources of credit. Primary Agricultural Credit Societies (PACS) are the major institutional agency which provide finance support to the farmers from which more than 48 per cent of the farmers have availed loans. For

input market, respondents depended on Krishi Bhavan (78%) and for selling the product major intermediary was private traders (51%), followed by SUPPLYCO (49%).

The overall agriculture information needs of the farmers are identified and classified into information regarding production, post-harvest techniques, market, credit, agricultural insurance, government schemes and labour. The most needed agricultural information by the respondent farmers is about government schemes followed by market information. In agricultural operations, the information gap is zero in production and market information which indicate that these are the two important agriculture information, farmers accessing regularly.

Marketing information needs of the farmers were identified and classified into nine categories, viz, information needs on input supply, market profile, grades and standards, market research studies, market trend, export market, improved marketing practices, warehouse facilities and futures trading. The most needed marketing information is about market trend and the least needed are on export markets, futures trading and market research. The market information gap is zero for input supply and market trend implying that farmers have more access to these marketing information. Access gap is high for information on improved marketing practices, futures trading and export markets since farmers rely on traditional method of marketing.

Farmers have better accessibility to marketing information through newspaper, telephone and television whereas computer, radio and farm magazines have less accessibility. Poor access to farm magazines is the major cause for access gap with respect to farm magazines. Usage gap as the difference between access and actual use is zero for newspaper in the case of marketing information. But the usage gap is the highest in the case of computer and internet. Newspaper is still the main source of marketing information to the farmers.

Information on current market price is the most important information for farmers since it has direct relation with profitability of farmers. Most credible source of marketing information among the ICT tools used by the farmer respondent is newspaper and the least credible ICT tool is computer and internet followed by radio.

Similar to marketing information, the most popular and credible source of credit information to the farmers are newspaper whereas computer and internet are least accessed by the farmers for credit information. With regard to the usage gap, credit information through all the ICT tools are not commonly used by the farmers. For the respondent farmers, personal source of credit information is more trustworthy and reliable than credit information from ICT tools.

The third and last objective of the study is to analyse the constraints in using ICT tools by the farmers so as to enable policymakers to design strategies for effective use of these tools for agricultural information dissemination. Constraints vary with media used for information and communication. Lack of time to read and comprehend is the major constraint pointed out by the farmers with respect to newspapers whereas the major constraint in the use is the availability of alternative sources like television. According to the farmers, farm magazines do not contain the information required by them and cannot improve their farming operations. Major constraint reported is the unsuitable time of telecast of television while lack of awareness is the major constraint identified by the farmers in the case of telephone. It is reported that 64 percent of the farmers are facing the constraint of lack of technical skill in the use of computer and internet.

As part of the study, ICT enabled Market Information System of Vegetable and Fruit Promotion Council Keralam (VFPCK) is examined. Market Information Centre (MIC) is envisaged for creating an information system that will provide vital market information to the fruit and vegetable farmers and to the horticulture sector as a whole. From farmers' point of view, farmers' market including VFPCK is actually

a traders' market and it is another platform for exploitation of the farmers by the middlemen.

Information and Communication Technology tools are an effective way to disseminate agricultural information particularly marketing and credit related information. Among the ICT tools, print media especially newspaper is popular among farmers whereas modern ICT tools like mobile phone, computer and internet are not trendy among farmers.

Among the ICT tools, print media especially newspaper is popular among farmers whereas modern ICT tools like mobile phone, computer and internet are not trendy among farmers. A small portion of farmer community is actually using agricultural information especially about current market price and agricultural loan from ICT tools mainly newspaper. All the ICT tools are actively disseminating agricultural information. The problem is with regard to the end users. Farmers are reducing concentration on farming and move on to other occupation because of non profitability ofn this context, farmers are not requiring information disseminated through ICT tools for small scale cultivation. Also new generation who has the skill to operate modern ICT tools are keeping away from farming operations. Hence, concerned authorities should take necessary steps to make the farmers, withstand in agricultural operations and attract youth to the profession.

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ANNEXURE

INTERVIEW SCHEDULE

1. Name of the Panchayat: Ward No:

2. Demographic Details of Respondent:

Sl. No.	Name of Family Members	Relation	Age	Education	Occupation	Occupational Income/ Month

3. Asset Details

Sl. No.	Types of Assets	Unit	Volume	Annual Asset Income	Present Value of the Asset
A	**Physical Assets**				
1	Land				
2	Building				
B	**Financial Assets**				
3	Deposits				
4	Investment and gold				
5	Others (specify)				
C	**Other Assets**				
6	Poultry				

7	Piggery				
8	Milch animals				
9	Fish				
10	Others (specify)				

4. Land Use Pattern

Sl. No	Pattern	Area
1	Gross land	
2	Area used for cultivation	
3	Cultivable area	
4	Uncultivable area	

5. Details of Cropping Pattern

Sl. No.	Crops	Area Under Cultivation	Production		Cost of Cultivation p.a	Sales Volume	Market Price/Unit
			Unit	Volume			

6. Sources of Credit

Sl. No	Source	Amount of Credit	Amount Repaid	Amount Outstanding	Interest Rate	Term of Repayment
1	Public sector banks (specify)					
2	Private sector banks (specify)					
3	Co-operative banks					
4	Regional Rural Banks					
5	Money lenders					
6	Friends					
7	Owned funds					

7. Method of Marketing – Purchases and Sales

Sl. No	Input / Output	Input / Output source	Information source
A	Input		
1			
2			
3			
B	Output		
1			
2			
3			

8. General Agricultural Information Needs of Farmers

Sl. No	Information Needs	Tick and Rank the Information Needed	Information		Information Source
			Aware (Yes/ No)	Access (Yes/No)	
1	Production information				
2	Post Harvest Techniques				
3	Market information				
4	Credit information				
5	Agricultural insurance				
6	Government schemes				
7	Specify if others				

Note: Rank: 1-Highly needed 2- Moderately needed, 3-Less needed, 4-Not at all

9. Market Information Needs of Farmers

Sl. No	Information Needs	Tick and Rank the Information Needed	Information		Information Source
			Aware (Yes/ No)	Access (Yes/No)	
1	Input supply				
2	Market profile				
3	Grades and standards				
4	Market research studies				

8. General Agricultural Information Needs of Farmers

Sl. No	Information Needs	Tick and Rank the Information Needed	Information		Information Source
			Aware (Yes/ No)	Access (Yes/No)	
1	Production information				
2	Post Harvest Techniques				
3	Market information				
4	Credit information				
5	Agricultural insurance				
6	Government schemes				
7	Specify if others				

Note: Rank: 1-Highly needed 2- Moderately needed, 3-Less needed, 4-Not at all

9. Market Information Needs of Farmers

Sl. No	Information Needs	Tick and Rank the Information Needed	Information		Information Source
			Aware (Yes/ No)	Access (Yes/No)	
1	Input supply				
2	Market profile				
3	Grades and standards				
4	Market research studies				

5	Market trend				
6	Export market				
7	Improved marketing practices				
8	Warehouse facilities				
9	Futures trading				
10	Others (specify)				

Note: Rank: 1-Highly needed, 2- Moderately needed, 3-Less needed, 4-Not at all

). Credit Information Needs of Farmers

Sl. No	Information Needs	Tick and Rank the information needed	Information		Information Source
			Aware (Yes/ No)	Access (Yes/No)	
1	**Source of loan and terms and conditions of loan**				
A	***Public sector banks***				
a)	Eligibility conditions				
b)	Procedural formalities				
c)	Documents				
d)	Interest rate				
e)	Loan amount				
f)	Mode of repayment				
g)	Security				

B	***Private sector banks***				
a)	Eligibility conditions				
b)	Procedural formalities				
c)	Documents				
d)	Interest rate				
e)	Loan amount				
f)	Mode of repayment				
g)	Security				
C	***Co-operative banks***				
a)	Eligibility conditions				
b)	Procedural formalities				
c)	Documents				
d)	Interest rate				
e)	Loan amount				
f)	Mode of repayment				
g)	Security				
D	***Regional Rural Banks***				
a)	Eligibility conditions				
b)	Procedural formalities				
c)	Documents				
d)	Interest rate				
e)	Loan amount				
f)	Mode of repayment				
g)	Security				

E	***Money lenders***				
a)	Eligibility conditions				
b)	Procedural formalities				
c)	Documents				
d)	Interest rate				
e)	Loan amount				
f)	Mode of repayment				
g)	Security				
F	***Micro finance***				
a)	Eligibility conditions				
b)	Procedural formalities				
c)	Documents				
d)	Interest rate				
e)	Loan amount				
f)	Mode of repayment				
g)	Security				
2	**Types of credit facilities**				
	Agricultural finance				
a)	Crop loan				
b)	Kisan Credit Card				
c)	DRI scheme				
d)	Agricultural Gold Loan				
e)	Loans for land purchase				

f)	Loan for land development				
g)	Credit for minor irrigation				
h)	Credit for farm mechanization				
i)	Finance to horticulture				
j)	Other agricultural term loans				
	Consumption loans				
a)	Home loan				
b)	Personal loan				
c)	Vehicle loan				
d)	Education loan				
e)	Others				
3	**Interest subvention schemes and subsidies**				
4	**Others(specify)**				

Note: Rank: 1-Highly needed 2- Moderately needed, 3-Less needed, 4-Not at all

11. Which of the following sources do you use for obtaining marketing and credit information?

Sl. No	Information source	Marketing							Credit						
		Aw (Y/N)	Ac (Y/N)	U (Y/N)	F.O.U	Pu.	Cr.	Pgm	Aw (Y/N)	Ac (Y/N)	U (Y/N)	F.O.U	Pu.	Cr.	Pgm
1	Newsp														

	aper														
2	Farm magazines														
3	Radio														
4	TV														
5	Telephone														
6	Computer and Internet														

Note: Y-Yes, N-No, Aw: Aware, Ac: Access, U: Use, F. O. U: Frequency Of Use, Pu: Purpose, Cr: Credibility, Pgm: Programme. Rank: Frequency of use: 1- Daily, 2- Weekly, 3- Occasionally, 4-Rarely, 5- Not at all Credibility: 1-Highly credible 2-Moderately credible 3-less credible 4-not at all credible

12. Which information source is assessed best with respect to each of the aspects? Rank based on performance

Sl. No	Information Sources	Rank in Order of Performance		Programme
		Credit	Marketing	
1	Newspaper			
2	Farm magazines			
3	Radio			
4	TV			
5	Telephone			
6	Computer and internet			

13. Assess the following source of information with respect to the specified aspects.

Sl. No	Information Sources	Information Availability		Information Adequacy		Information Relevancy		Information Accuracy	
		C	M	C	M	C	M	C	M
1	Newspaper								
2	Farm *magazines*								
3	Radio								
4	TV								
5	Telephone								
6	Computer & Internet								

Note: C- Credit Information, M-Marketing information

14. Do you face the following constraints from information sources?

Sl. No	Constraints	Yes/No	Rank in Order of Preference
A	***Newspaper***		
1)	Ignorance to comprehend the information		
2)	Poor access to the newspaper		
3)	Personal impediments		
4)	Lack of time to read and comprehend		
5)	Others (Specify)		
B	**Farm magazine**		

1	Poor access to the magazines		
2	Personal impediments		
3	Cost of subscription		
4	Further clarification about information is difficult		
5)	Others (specify)		
C	***Radio***		
1	Problem in relay		
2	Broad casting time is not suitable		
3	One way communication		
4	Cost of maintenance		
5	Others(specify)		
D	***Television***		
1	Problem in telecasting		
2	Telecasting time is not suitable		
3	One way communication		
4	No enough time to watch TV		
5	Others (specify)		
E	***Telephone***		
1	Difficulty in connection		
2	Lack of technical skill		
3	Limited information		
5	Cost of the technology		
6	Others(Specify)		
F	***Computer and internet***		

1	Cost of technology		
2	Lack of updated information		
3	Lack of technical skill		
4	Lack of awareness		
5	Others (Specify)		

15. Suggestion for improving Marketing and Credit information to farmers