Good Practices in Agricultural Extension in South Karnataka, India

Discussion Paper 16

MANAGE- Centre for Agricultural Extension Innovations, Reforms, and Agripreneurship (CAEIRA)

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Authors
Mr. Dharmaraj B. M.
MANAGE Intern & M. Sc (Agricultural Extension)
UAHS, Shivamogga, Karnataka
e-mail: bmdharmaraj@gmail.com

Dr. Saravanan Raj
Director (Agricultural Extension)
National Institute of Agricultural Extension Management (MANAGE)
Rajendranagar, Hyderabad, Telangana, India
e-mail: saravanan.raj@manage.gov.in/ saravananraj@hotmail.com

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Ms. Niharika Lenka

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Director General's Message

Smt. G. Jayalakshmi, IAS
Director General, MANAGE

I appreciate Mr. Dharmaraj B. M., MANAGE intern and former M.Sc. Scholar, University of Agriculture and Horticultural Sciences, for opting the topic "Good Agricultural Extension Practices in South Karnataka, India" with thorough data collection and field analysis.

This study encompasses the linkages and impact of various agriculture extension providers on farmers in the Shivamogga and Chikkamagalur districts of southern Karnataka. Agriculture is the mainstay of the Indian economy because of its high share in employment and livelihood creation. Agriculture is the means of livelihood for around two thirds of the work force of India. This makes it one of the most important sectors of the economy. In India, farmers engaged in farming are mostly from small and marginal farmers. The challenges like climate change affect the agriculture by changing the crop cycle, reducing the yield, decreasing coastal areas under cultivation, affecting physiology of crops which ultimately affects the livelihood of the farmers.

Thus agricultural extension system plays major role in helping farmer in informed decision making, knowledge on new technologies in agriculture. In Agricultural Extension, various players like public sector, private / corporate sectors and NGO based advisory systems all together working for the transfer of farm technology to the farmers. In spite of these farm advisory system the farmers also dependent on Information Communication Technologies (ICT) like YouTube, Facebook and what's app via their mobile phones.

In this view of various channels of information on farm advocacy is being advising from different players of the agriculture extension system. The institutional linkage among farmers as well as role and approach of different sectors in providing farm advisory services and its impact is being analyzed. The various case studies on Good Practices in Agriculture Extension are also documented. Let me appreciate Dr. Saravanan Raj, Director (Agricultural Extension) for guiding Mr. Dharmaraj B M successfully. The paper helps farm advising organizations, policy makers who need to focus more on agricultural extension system for better uplifting the famers in their informed farm decision as well as maximum outreach of farm technology.

(G. Jayalakshmi)

PREFACE

Agricultural extension and advisory services are mainly aiming to strengthen the farmer's capacity to innovate, by providing access to knowledge and information. It provides efficient and effective need-based extension services to all categories of farmers, to enable them to optimize their use of resources, in order to promote sustainable agricultural and socio-economic development. The available improved agriculture technology has the potential of raising the yields of agriculture products in the country in a profitable way. This can only be done, under the existing set of conditions, if the technology is communicated to the farmers in proper way such that they should also be convinced of its economic benefits in their local conditions.

In order to strengthen the extension system, public sector as well as civil societies are working for the agricultural extension and advisory services to the farmers and other stakeholders through various public-private institutional arrangements such as Krishi Vigyan Kendra (KVK), Agriculture Technology Management Agency (ATMA), Farmer Producer Organizations (FPO), State Agricultural Universities (SAUs), Agriculture Technology Information Centre (ATIC), and NGOs which are playing key role in knowledge management and capacity building of farmers. The role and approaches of extension services used by various stakeholders in extension advisory services are discussed sufficiently. The paper analyses the linkages between sectors and concluded in an easiest and better way.

The paper also discusses the impact of good practices used by extension service providers to farmers to improve their livelihood. The paper is very much useful to the policy makers and extension agents to understand the other extension practices needed and benefits of linkages between different sectors to facilitate and manage the knowledge to the farmers enabling them to face the new challenges in farming.

The paper concludes that for the better farming and agricultural extension and advisory services, following four are essential: (1) Encouragement to the collective farming (2) Improved Information and Content development. (3) More emphasis should be given on ICT based extension (4) Enhanced funding, convergence and co-ordination.

Dr. Saravanan Raj
Director (Agricultural Extension)

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Abbreviations

ABC	Amalgamated Bean Company
AHTIC	Agricultural and Horticultural Technology Information Centre
ATIC	Agriculture Technology Information Centre
ATMA	Agriculture Technology Management Agency
CAMPCOs	Central Arecanut and Cocoa Marketing and Processing Co-operative Limited
CD ROMs	Compact-Disc Read Only Memories
CHSC	Custom Hiring Service Centers
CoH	College of Horticulture
CRDS	Chaitanya Rural Development Society
DATC	District Agriculture Training Centre
DFI	Dalwai Committee on Doubling Farmers Income
EAS	Extension Advisory Services
FFS	Farmer Field School
FGD	Focus Group Discussion
FIG	Farmers Interest Group
FLD	Front Line Demonstrations
FMD	Foot and Mouth Disease
FPOs	Farmer Producer Organizations
ICT	Information Communication Technology
IFPRI	International Food Policy Research Institute
IVRS	Integrated Voice Response System
KVK	Krishi Vigyan Kendra
MAMCOs	Malnad Arecanut Marketing Co-operative Societies
MD	Method Demonstrations
NFDB	National Fisheries Development Board
NGOs	Non-Government Organizations
OFT	On Farm Trials
PAS	Public Addressing System
RSK	Raita Sampark Kendra
SAUs	State Agricultural Universities
SHGs	Self Help Groups
SKDRDP	Sri Kshetra Dharmasthala Rural Development Project
SMS	Short Message Services
TUMCOs	Tota Utpannagala Marata Sahakara Sangha Niyamith
UAHS	University of Agricultural and Horticultural Sciences
UPASI	United Planters Association of Southern India

Abstract

This paper presents an overview of the good practices in agricultural extension and its impact on farmers in the region of South Karnataka state. As in many other countries worldwide, extension service provision is characterized by the multiple service providers responding to the needs and demands of farmers. This is unlike in the recent past when agricultural services were mainly delivered by the public sector. The post structural economic reforms during post-independence period in the country was given much emphasis on industry, tax reforms, foreign trade and investments without any specific focus on agriculture due to lack of advanced tools and methods in transfer of technology to the farmers.

With the emergence of green revolution (1970s), importance of agricultural extension in the global continued to evolve. Agricultural extension with its focus on increasing farm production via technology transfer, participatory and demand driven approaches which accounted in accelerating towards end users i.e. farmers (Sulaiman and Hall 2008; Swanon 2009). But the major drawback in a country like India, agriculture is the home of small and marginal farmers (85% of total landholdings) as per the last Agriculture Census (2010-11). Now, agricultural extension has become as an essential tool for delivering information and advice for modem farming in order to meet the global and national demand. For the present study two districts of South Karnataka State were selected as farmers are advised on information by a greater number of agricultural institutions as well as organized groups.

The study area is having SAUs, Coffee Board, a greater number of farmer-based organizations and civil societies, NGOs working for agricultural extension. Majorly this region is facing unavailability of farm labors, smaller landholding etc. Results of the present study were found that average mixed impact of good practices in extension on the livelihood of farmers in the study area. As in this region extension activity is carried by various stakeholders were accepted by farmers for the farming activity which are disseminating by various extension methods such as crop seminars, group discussion/ meeting, farmer field school, video-based extension (Pico projectors), Facebook, what's app group communications, training, workshop etc. Coffee board of India is also active working for dissemination of coffee farming practices to the farmers, as Chikkmagaluru stands first in production and area in coffee farming in the country. It is also found that, there are less or no links between public and private sectors for disseminating the technology to the farmers and the extension agents couldn't reach many farmers due to lack of human resource hence it is becoming barrier to give the proper advocacy to the community.

Thus, extension services need to be strengthened and agents are to be provided with the necessary equipment's and logistics so that they can reach farmers more easily with agricultural technologies. They should also focus on skill development and capacity building of extension agents in the view content development during the dissemination of information via social media are needed to achieve better results in extension activities that help in enabling farmers to help themselves in taking informed farm decision and improving the livelihood in an efficient way.

Executive summary

Agriculture extension can be defined as a function of providing required and demand-driven knowledge and skills to rural men, women and youth in a non-formal, participatory manner, with the objective of improving their quality of life (Qamar, 2005). Pluralistic extension recognizes the inherent differences that exist between farmers and farming systems and the need to address new challenges in agriculture development with different approaches.

Agricultural extension has changed over the period of years by different degrees of progress from a system of top-down dissemination of information from experts to farmers to a more complex system, in which a diversity of knowledge producers and farmers work together to co-produce information.

The expansion of public extension services created new challenges for the delivering of extension services. Within the pluralistic extension system of the country, civil societies, NGO's, farmer-based organizations and private commodity extension organizations play an important role in supporting smallholder farmers (Gemo, H[illegible], 2013).

Therefore to know the impact of good practices in agricultural extension on farmers, to know what are the different strategies used and role of extension services to educate farmers on various farming aspects the present study was conducted in two districts namely Chikkmagaluru and Shivamogga of South Karnataka State. The study areas have the greater production and cultivated area of coffee, spices, paddy and areca nut respectively and also the region have greater number of agricultural institution working to provide advocacy to farmers on various aspects of cultivation practices.

As in this region extension activity is carried out by various stakeholders is accepted by farmers for various farming activities such as land preparation, selection of variety/ seed, manure and fertilizer application, weed management, water management, and plant protection measures, harvesting and threshing technology and also including animal husbandry practices. All these are disseminating by various extension methods like video-based extension (Pico projectors), Facebook, what's app group communications, training, workshop etc.

Coffee board of India is also working actively for dissemination of coffee farming practices through IVRS system called Coffee Krishi Taranga in an effective manner to the farmers, as Chikkmagaluru stands first in area and production of coffee farming. Study also found that, there are less or no linkages between public and private sectors for disseminating the technology to the farmers and the extension agents couldn't reach many farmers due to lack of human resource hence creating barriers to give the proper advocacy to the community.

Thus, extension services need to be strengthened and the agents are to be provided with necessary

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Introduction

1.1 Background

"If agriculture goes wrong, nothing else will have a chance to go right in the country"

-M. S. Swaminathan

The history of Agriculture in India dates back to Indus Valley Civilization and even before that in some places of Southern India. Agriculture is called as noblest profession, as this makes society happy, wealthy, healthy, honest, and spiritually advanced for a better life but one of the greatest hurdles of agricultural advocacy is convincing people to see the importance of farmers. It is just as important because it impacts our daily lives.

Agricultural extension can be defined as a function of providing required and demand-driven knowledge and skills to rural men, women and youth in a non-formal, participatory manner, with the objective of improving their quality of life (Qamar, 2005). Pluralistic extension recognizes the inherent differences that exist between farmers and farming systems and the need to address new challenges in agriculture development with different approaches.

Agricultural extension has changed over the period of years by different degrees of progress from a system of top-down dissemination of information from experts to farmers to a more complex system, in which a diversity of knowledge producers and farmers work mic reforms during post-independence period was given much emphasis on industry, tax reforms, foreign trade and investments without any specific focu.s on agriculture due to lack of advanced tools and methods in transfer of technology to the farmers.

With the emergence of green revolution (1970s), the importance of agricultural extension in the global scenario continued to evolve. Agricultural extension with its focus on increasing farm production via technology transfer, participatory and demand driven approaches which accounted in accelerating towards end users i.e., farmers (Sulaiman and Hall 2008). But the major drawback in a country like India, agriculture is the home of small and marginal farmers (85% of total landholdings) as per the last Agriculture Census (2010-11).

The role of small farmers (small holdings) in poverty reduction is well recognized (Lipton, 2006). However, in the absence of robust public/private support system at the ground level, farmers face challenges in accessing land, water, inputs, credit, technology, and market. Then, there are emerging challenges like risk and vulnerabilities due to climate change and natural calamities (Thapa and Gaiha, 2011).

There are structural and governance challenges too. Though agriculture is a 'state subject' under the constitution, the central government plays a critical role in shaping macro level agricultural policies

where the states implement them. In spite of the challenges discussed above, there are technological as well as institutional innovations taking place to enable small farmers for increasing productivity and income through many innovative initiatives across the country.

1.2 Definition of Agriculture

Agriculture is the science and art of farming, including cultivation of the soil for the growing of crops and the rearing of animals to provide food, wool, and other products (Webster's dictionary).

1.2 Definition of Agricultural Extension

Extension is an informal educational process directed toward the rural population. This process offers advice and information to help them solve their problems. Extension also aims to increase the efficiency of the family farm, increase production and generally increase the standard of living of the farm family (Oakley and Garforth, 1985). Agricultural extension is mainly involved in transferring knowledge, attitude, and skills to farmers as well as in translating policy directions into action is well known.

1.3 Good Agricultural Extension Practices

Good practice is one that has been proven to work well and produce good results and is therefore recommended as a model. The essence of identifying and sharing good practices is to learn from others and to re-use knowledge. The biggest benefit consists in well-developed processes based on accumulated experience" (SDC, 2004).

1.4 History and Evolution of Agricultural Extension in India

India has a long tradition of agricultural extension. Agricultural extension in the post-independence era was supply driven approach and it was mainly the function of State departments of Agriculture. Some voluntary organizations (VO's) were also involved in agricultural development activities in different parts of the country, but with limited outreach. The Indian Council of Agricultural Research (ICAR) began its participation in agricultural extension through National Demonstrations in 1964.

A major change in public sector extension came with the implementation of the World Bank sponsored Training and Visit System (T&V) in 1974. Most States adopted the T&V system during the 1980s and this improved the financial and human resource capacity of the extension system. The 1970s also witnessed the launch of Krishi Vigyan Kendras (KVKs) or Farm Science Centres, Operational Research Programmes (1974) and Lab-to-Land programs (1979) by the ICAR.

Krishi Vigyan Kendras (KVKs) were begun by ICAR with the mandates of providing need-based and skill-oriented vocational training to farmers, field-level extension workers, and other self-employed persons. KVKs were meant to bridge the gap between technology developed at research institutions

and its adoption at the field level. Their role was to feed proven technologies to the central extension system.

As technology improves over the period, several approaches have evolved and have been disseminated to improve the living standard of rural farmers more so, in many developing countries, agricultural development is carried with extension services by helping farmers to identify, analyse and linking with research on their production problems. They also create awareness on opportunities for improvement of farm yields leading to increased income and a better standard of living. (Van den Ban and Hawkins, 1998).

Later as the effect of globalization resulting the influence on many sectors in the world, just like agriculture sector also. Privatization and pluralistic models started working better as compared to public sector alone. Earlier the public system was only the main actor in delivering the advisory services but now the scenario has changed. Many players started taking part in the advisory system such as non-government organizations, civil societies, input and technology providers, agribusiness, facilitators, producer organizations and private companies.

Now, agricultural extension has become as an essential tool for delivering information and advice for modern farming in order to meet the global and national demand. Since commercial farmers can derive direct financial benefits from these inputs, there is a trend towards the privatization of the extension organizations.

As earlier the extension was focusing on agricultural production and productivity but now there is scope for market led extension as farmers are shifting from traditional farming to high value crops like fruits and commercial crops considering the view of high profit motive and sustainable income centric motive. Many successful examples ensure successful advisory services by non-government players are bringing improvement in the living standards of farm families.

Box 1. Women farmers group for credit requirements and to help themselves

Women Farmer Groups in Khurda District, Orissa, India. Women FIGs at Keranga village (Khurda block) started credit to meet the requirement of the farmer members. It has promoted dairy development activity converging credit requirement through other schemes, organized milk sale on cooperative basis. The Keranga dairy group has been empowered substantially – now the group has appointed a retired veterinary doctor on honorarium basis for health cover to cows and poultry not only for their own village but also for adjoining village

It has been well known that information is a critical input for agricultural development just as credit, seed, nutrients and water which can result in better economy. Also, in the present-day privatization witnessing that private enterprises are far more efficient than government agencies in delivering goods and services and that farmers do not hesitate to pay for valuable information, fail proof services and delivery mechanisms, if they get additional returns at the time of harvest (Shalini, 2001).

1.5 Importance of Agricultural Extension in Agriculture

Agricultural extension plays a crucial role in increasing agricultural productivity, increasing food security, improving rural livelihoods and helps to promote economic growth worldwide. Agricultural extension is also known as agricultural advisory services which plays an important role in the livelihood activities of rural communities and helps in ensuring about access to improved technologies, assistance in the creation of production groups, delivering information on new technologies and innovations to agricultural manufacturers.

Agricultural extension services and programs are mainly aiming to strengthen the farmer's capacity to innovate, by providing access to knowledge and information. It provides efficient and effective need-based extension services to all categories of farmers, to enable them to optimize their use of resources, in order to promote sustainable agricultural and socioeconomic development (Hoque and Usami, 2007).

The available improved agriculture technology has the potential of raising the yields of agriculture products in the country in a profitable way. This can only be done, under the existing set of conditions, if the technology is communicated to the farmers in proper way such that they should also be convinced of its economical adoption in their local conditions. It is not only restricted to transfer of technology in fact, it should be beyond that in terms of purpose-specific, target-specific, and need-specific thus enabling farmers to help themselves in improving the livelihood in an efficient way.

Thus it helps to improve the agricultural production, post-harvest technology, marketing, distribution and utilization of agricultural inputs and outputs in effective way, accessing knowledge on conservation, development and use of natural resources, managerial skill of farm and home, better family living, rural youth development in leadership as well as helps in social participation thus ensures improving public affairs for all round development.

1.6 Global trends on Agriculture Extension

Extension has mostly been a state (provincial) subject in most of the developing countries with the service being offered mostly free of cost to farmers. But in many developed countries and in few developing countries, privatization was attempted which yielded mixed results. Similarly, there have been several experiments with public-private partnerships (PPP).

The global food and agriculture sector face several new challenges. While agribusiness companies

and globalized supply chains are transforming agriculture in many parts of the world, the sector faces several new challenges. These include: changing climate, a depleting natural resources base, unstable market dynamics, the unrealized productivity potential of youth and women, along with the critical need to feed the world's growing population through sustainable farming practices.

There are approximately 1.5 billion smallholder farmers in the world, a figure that includes 75 percent of the world's poorest people (Ferris et al., 2014). Most people living in extreme poverty depend on agriculture for their livelihoods. These smallholder and marginal farmers provide approximately 80 percent of the food in many developing countries, and even more in South Asia and Sub-Saharan Africa. Smallholders in many developing countries remain disadvantaged when it comes to accessing quality extension and advisory services (EAS) (Glendenning et. al., 2010).

In South Asia, the agricultural sector is dominated by small farms – often with weak bargaining powers and a limited political voice. Women constitute the majority of the agricultural labor force in small-scale and subsistence farming in the region. The Global Food Policy Report (IFPRI, 2018) reported that "South Asia is highly vulnerable to climate change, as climate variables such as temperature, rainfall, flooding, and drought increasingly affects agricultural activities". These new challenges also mean that Extension advisory services need to tackle.

While the Extension Advisory Services (EAS) need more human and financial resources to address these new challenges, trends towards state withdrawal from extension and decreased public funding initiated in several countries during the 1990s affected the delivery of EAS ratio of agents to farm families Bangladesh 1:900 – 2,000, Guinea 1:10,000, Liberia 1:1,000 – 1:5,000, Malawi 1:642 to 1:1279, Mozambique 1:111 – 1:787, Nigeria 1:5,000 – 1:10,000 (28% female; 60% over 40 years of age), Rwanda 2,500 farmer field school facilitators 14,200 farmer, Senegal 500 public, private, NGO agents 9,100 farmer-trainers (Developing Local Extension Capacity (DLEC) Project, 2018).

There is a major scarcity of extension staff at various levels. As per the report, in 2012-13 one extension functionary served 1162 operational holdings (broadly, sectoral variations exist). The DFI committees of the opinion that the minimum ratio of extension service provider to farming family that is recommended is as follows: (i) Hilly areas 1:400 (ii) Irrigated areas 1:750 (iii) Rain fed areas-1:1000.

A total of 27,937 positions were sanctioned depending on the strength and eligibility of each state. As on 15/4/2017, only 13,672 positions were filled and 14,265 positions were vacant. If these ATMA vacancies are filled up then the ratio would improve from 1162 farmers per officer to 1037 farmers per officer. However, in South Asia, this gap has been partially filled by non-traditional extension providers such as NGOs, Private companies, Agri-businesses and Producer organizations.

In many ways, world has been becoming smaller. Globalization has occurred with the ease and rapidity of the development of transport and telecommunications. There is a tendency towards greater transnational corporate development. Some argue that there has been a power shift (Mathews, 1997)

from public sector dominance to private sector authority. As this development, financial problems in the public sectors of the developing countries emerged.

Demand-driven extension is desirable in many instances, although a balance must be maintained between the demands of government and those of farmers in different economic categories (e.g. estate, emerging, low-income, and marginal). Striking a balance between institutional supply systems and farmer-initiated demand-driven extension/technology systems in many cases should be the ultimate goal of countries eager to advance to higher stages of development and competitive power.

Formal extension services were provided by five sectors: i) public sector; ii) international technical and financial support agencies and national and international NGOs (which constitutes 43 per cent of the providers); iii) education and research institutions; iv) business unions and associations; and v) the private sector (Valenzuela et. al., 2017).

In Honduras with its high rates of cell phone use, two-thirds of extension providers used phone calls to provide technical recommendations to farmers and 16 percent used messaging or WhatsApp messages (Valenzuela et. al., 2017). In Guinea, the Extension Learning, Entrepreneurship, and Rural Innovation program was aiming to train a new cadre of young agriculture extension agent in a private-sector, entrepreneurial and business-oriented approach.

The program targets and recruit's youth between the ages of 18-35 who have graduated from the national agricultural schools to participate in a 10-month training program. After the training, graduates should be self-supporting or to be hired by EAS providers. The training includes topics such as production, market facilitation, financial marketing and input supply. The program has been planned to start with 320 youth in 2017 (Mac Nairn and Davis, 2018b).

1.6.1 Earlier worldwide efforts of various extension approach and purposes by FAO

One outstanding FAO participatory approach is known as Farmer Field Schools. (FFS), originally associated with promoting Integrated Pest Management, work at the grassroots level to advance the principle of stakeholder participation in decision-making with a view to eventually giving full responsibility to stakeholders for programs development. Later with same concept as Farmers' Forest Management Schools (FFMS) came into light.

According to (Tanaka, 2001), FFMS has two objectives. The one is to allow forest users flexible community forest management for multiple uses and assists forest users to gain/generate the knowledge, critical skills and self-confidence to make decisions about forest management based on their own experiments, observations and analyses so that the forest can sustainably provide them benefits suitable to their livelihood needs.

Then innovative programs, including the National Agricultural Extension Systems Reform Initiative

(NAESRI) were also assisted. It includes strengthening decentralized extension services developing the coordination mechanism for pluralistic extension delivery (Philippines, Zimbabwe, Indonesia, China, and Pakistan. Iran, Malawi, Zambia, Uganda, Vietnam and India). The World Agricultural Information Centre (WAICENT) has initiated Farm Net, a community-based program that aims at creating farmer information networks for agricultural and rural development.

In sum, FAO assists the developing countries in numerous and varied ways with the development of agricultural and rural extension. One common feature of these different endeavors is the participatory involvement of the people being assisted. All of the above-mentioned efforts - e.g. FFS, FFMS, NAESRI, Farm Net and Sustainable Livelihoods - encourage stakeholder involvement in the extension decision-making processes.

1.6.2 Factors responsible for changing global trends of agricultural extension

1. **Political, technical and economic or social**

Public organization is facing problem of budget allocation and human resources to outreach all the farmers, they lack with technical professional to identify, analyze and to solve the problem instead of providing need specific services. They are providing supply driven advisory. This trend is making farmers to bend towards advisory services of non-traditional advisory providers like NGOs, Private companies.

2. **Location specific or region/country specific models**

Extension advisory providers must ensure the knowledge providing to the farmers community/region is whether useful or not. As there is extension, requirement of farmers varies from place to place. The providers have to use the most appropriate model/approach to reach the farmers in making them to adopt the solutions.

3. **Privatization**

Private organizations are occupying the areas of public based organization, showing inefficiency in extension and advisory services. Private companies not only restricted to transfer of technology indeed it uses purpose-specific, target-specific, and need-specific approaches and to enable farmers to help themselves in improving the livelihood in an efficient way.

4. **Market liberalization**

As the effect of globalization, market liberalization made the producers to think out of the box in exploring the markets of different regions in the world. This brought considerable change in farming system, post-harvest methods, packing, storage and processing of their produce.

5. **Democratization and participation.**

Pluralism and decentralization move in agricultural extension services enhanced the social and organizational participation of farmers. It also strengthens the farmers by giving value to voice of extension. As the effect of pluralistic move, many NGOs and private companies are started extension advisory services under funding support of public organization.

6. **Commercialization and agri-business**

As the effect of commercialization, farmers shift in farming pattern, a shift from traditional cropping to high value commercial crops can be seen. The agri-business facilitators, processing units started bridging the marketing facilities.

7. **Disasters and emergencies**

Due to continuous change in climate, unprecedented natural calamities like flood, drought, landslide, tsunami etc., are greatly affecting agriculture and people of rural areas. So, the different rural extension and agriculture advisory services started rehabilitating the disaster affected areas and farmers and helping them to organize their lives to setback in sustainable manner.

8. **Rural poverty, hunger and vulnerability**

Disasters affects rural poor in many ways as they remain in hunger and poverty. Hence the extension is playing a vital role in educating them to live in standard manner. It also helps rural poor to find income generating activities to meet their daily food and shelter.

1.6.3 Different Good Agricultural Extension Practices in various countries

Approach / Practice	Country
Decentralized extension services	**********
Fully or partially privatized extension	Fully or partially privatized extension
Pluralistic extension system	Pluralistic extension system
Pluralistic extension system	Succeeded in Malawi, Uganda and Zambia
Application of Information Technology	Egypt, Ireland and Italy
Participatory extension	**********
Unified extension service	Uganda, Iran, Indonesia and The Phillippines

(**Source**: Agricultural Communication: Opportunities for Sustainable Agriculture and Rural Development)

1.7 Agriculture and agricultural extension system in India: current status

With the 329 million hectares of the geographical area the country presents a large number of complex agro-climatic situations in respect to soils, climate, physiographic and natural vegetation. According to The National Bureau of Soil Survey & Land Use Planning (NBSS and LUP) there are twenty agro-ecological zones in the country.

Thus, Extension will take different models, strategies, approaches, organizational structures, human expertise and methodologies depending on the situational context which will be different in different locations and therefore dependence on any single organizational structure or strategy, approach which is promising in some other location will not be logically right for entire region or nation.

IFPRI studies revealed that a significant number of farmers are also accessing public sector extension, especially the staff of the Department of Agriculture. For instance, in Tamil Nadu, the main sources of agricultural information in 2010 was the input dealer (68.60 %), followed by the state department of agriculture extension staff 51.20 per cent.

In Karnataka, of the 966 farmer households surveyed in 2006, 22.00 % had at least one contact with a government extension worker during the past year. In Uttar Pradesh, only 18.00 % of households used extension (from any source, public or private) in the past year. Out of these, only 7.00 % were from state extension officers.

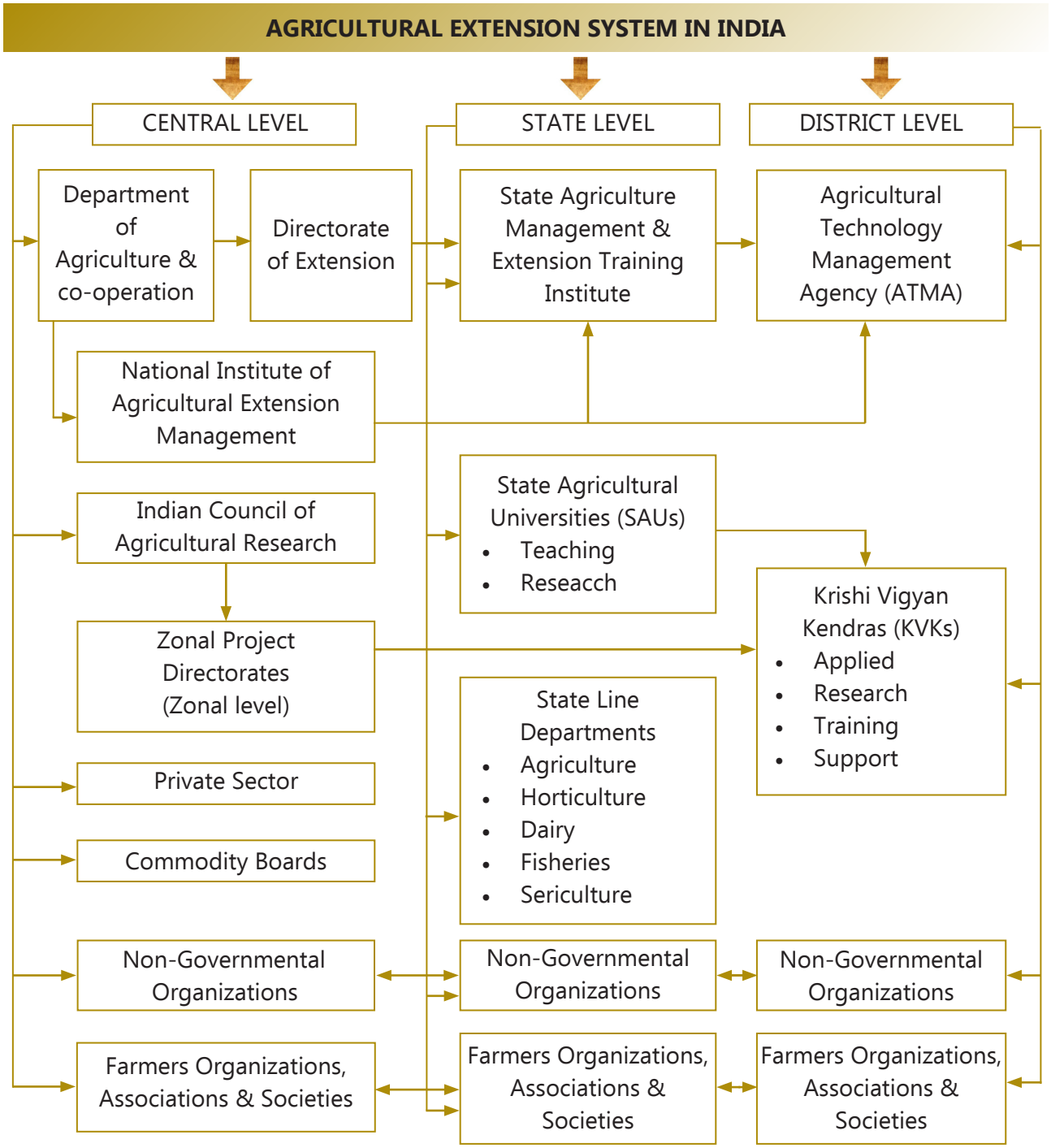
Other public-sector extension sources put together (KVK, All-India Radio and University extension and plant protection unit) were used 18% of the time. The remaining 75% of extension comes from the private sector (Babu et al., 2012).

There has been changing nature of agricultural methods in India mainly because of shrinking source, changes in demand and consumption pattern, changing farming systems, mainly decline in public investment on agriculture and International developments.

1.8 Organizational setup of Agricultural extension system in India:

(Public, Private, Cooperative and non-government agency)

Earlier public funded government organization used to provide extension and advisory and now new non-traditional actors providing extension services, such as non-governmental organizations (NGOs), private companies engaged in agribusiness (e.g.: selling inputs and procurement and value addition of farm produce), producers' organizations, independent consultants, Cooperative, ICT etc.



(Source: Au[illegible]s; Singh *et. al.*, 2014)

Figure 1: Agricultural Extension Systems in India.

Major organizations / stakeholders of extension/advisory service providers (EAS)

I. Public sector for Agricultural Extension Services

Since from late independence, agriculture extension system in India evolved through Government's Community Development Project (CDP) during 1952 followed by National Extension Services in 1953,

National Demonstrations (ND) in 1964 and World Bank sponsored Training and Visit System (T&V) in 1974 were the efforts made to educate the farmers to adopt and utilize the modern method of farming techniques. The public institution is mainly advisory and funding for EAS will be incurred by government itself. The strength of public extension systems lies in their strong reach and wide network, coverage to a broad spectrum of agriculture and a provision of free services (Tiwari and Pandey, 2001).

1. Training and Visit System (T&V) by World Bank

To reform in the system of public extension, World Bank's Training and Visit (T & V).
Program was introduced as a pilot programme in Rajasthan in 1974 and by 1977 it was scaled up to several states (Ameur, 1994). Under T & V, agriculture extension was expected to act as a 'transmission belt' between agricultural research centres and farmers (Picciotto and Anderson, 1997) by recruiting, training, and deploying large and dedicated cadre of technical workers with formal training in agriculture technology.

2. Agriculture Technology Management Agency (ATMA)

ATMA is a registered society responsible for technology dissemination at district level. It is a focal point for integrating research, extension and marketing. In 1998 Indian government with the help of World Bank, introduced the Agriculture Technology Management Agency (ATMA) under the Innovation in Technology Project (NATP). As a pilot it is introduced in 28 districts of seven States during 1998 to 2003 then scaled up throughout the country in 2005 (Babu et. al., 2013).

It is decentralized day to day management of the Agricultural Technology System (ATS). It allows receiving and expanding project funds entering into contracts and agreements and maintaining revolving accounts. It has links with all the line department, research organizations, non-governmental organizations and organizations associated with agricultural development in the districts. Each ATMA has a governing board. The district collector will be the chairman of the board ATMA with other district level officials such as agriculture, veterinary, fishery etc., as member the farmer's woman representative is also taken ability to take all discussion concerning programme.

Box 2. Success Story of ATMA Khurda, Orissa

India Agricultural Technology Management Agency (ATMA) Khurda, Orissa was registered as an autonomous institution in 1998 under the NATP. The aim of pilot-testing new institutional arrangements and operational procedures involving a farmer-centric, decentralized decision-making process at district level. This Agency has begun showing impact of innovative strategies pilot-tested over the past two years. Some of its achievements are: Increase in acceptability of technology due to farmers involvement in identification of technology gaps, Active involvement of scientists on farmers field, Result-oriented new technologies addressing location-specific

needs of the farmers , Use of information technology among farmer interest groups (FIGs), SHGs of unemployed rural youth ranging from 10 to 20 members with activities of mixed farming to poultry fishery, dairy, nursery and mushroom cultivation, diversification with high value crops including floriculture adopted, credit linkages established with commercial banks; Kisan credit cards distributed, ATMA-supporting establishment of kiosk at Banpur market for sale of products like vegetables, eggs and dairy products by the FIGs operating at grassroots level, success stories identified/documented by ATMA for dissemination to farmers.

3. National Mission on Agriculture Extension and Technology (NMAET)

The feedback on the performance of ATMA through various evaluation studies and the observations of the working group on extension set up by the Planning Commission to prepare for the Twelfth Five-year Plan paved the way a comprehensive new national scheme to address extension services.

The National Mission on Agriculture Extension and Technology (NMAET) was launched by the Department of Agriculture and Farmers' welfare (DACFW) in 2014-15 and takes a holistic view of extension by embedding components for technical support and training in four major sub-schemes. It aims to make the system farmer-driven and accountable by restructuring and strengthening existing agriculture extension programmes to enable the delivery of technology and to improve the current agronomic practices of farmers.

NMAET consists of four Sub Missions:

- Sub Mission on Agricultural Extension (SMAE)
- Sub-Mission on Seed and Planting Material (SMSP)
- Sub Mission on Agricultural Mechanization (SMAM)
- Sub Mission on Plant Protection and Plant Quarantine (SMPP)

4. Department of Agriculture and Cooperation, Ministry of Agriculture

The Department of Agriculture and Cooperation comprises several technical directorates / divisions and one of them is for agricultural extension. The Directorate of Extension, headed by a Joint Secretary cum Extension Commissioner, is the nodal organ of extension at the national level. The Joint Secretary is assisted by three Joint Commissioners.

The directorate provides policy guidelines and operational backstopping to the state level extension organizations. At times, it has directly implemented certain major programs. The directorate's technical area of operations are extension management, extension training, farm information, and National Gender Resource Centre in Agriculture (NGRCA, it is a focal point to converge all gender related activities & issues in agriculture & allied sectors and to render advocacy services to the States/ UTs; advocacy to mainstream gender issues in agriculture and natural resource management).

Raitha Mitra Yojane / Raitha Samparka Kendra, Dept. of Agriculture, Govt. of Karnataka

Raitha Mitra Yojane is a new demand driven Agricultural Extension System of the Karnataka state. It has replaced the earlier T&V system of Agricultural extension.

The Agricultural Extension Centres opened under this new programme at Hobli level are called Raita Samparka Kendras (RSK).

Objectives

1. To provide updated information on crop production options, practice of marketing etc.
2. To facilitate on site provision of critical inputs like seeds, bio-fertilizers, micro- nutrients etc.
3. To provide primary seed and soil testing facilities.
4. To provide a forum for on-farm demonstration about new technologies developed by both public and private sector agencies.

To meet the growing demands of farming community engaged in the pursuit of latest technologies, Raitha Mitra Yojane is implemented in the state since 2000-01. Accordingly, 745 Raitha Samparka Kendras have been established one at each hobli (sub-blocks) levels. Each RSK is headed by an Agricultural Officer (Agricultural Graduate) duly supported by Assistant Agricultural Officers and Agricultural Assistants, whose number is decided based on the agricultural potential in terms of cropping intensity, irrigation facilities crop diversification etc.

II. Autonomous bodies involved in Agricultural Extension Services

1. Indian Council of Agricultural Research

The Indian Council of Agricultural Research (ICAR) is an autonomous body under the Department of Agricultural Research and Education, Ministry of Agriculture. The council serves as the national apex organization for co-ordinating, guiding and managing agricultural research and education including horticulture, fisheries and animal sciences throughout the country. It comprises 4 deemed university, 65 institutions, 14 national research centre, 6 national bureau, 13 project directorates, 3 Central agricultural universities and 64 state agricultural universities spread across India. ICAR plays the vital role in promoting excellence in higher education in agriculture. Its Agricultural Extension Division covers extension activities (www.icar.org.in).

Under Digital knowledge drive ICAR has started many initiatives like Knowledge Innovation Repository of Agriculture in the North East (KIRAN) an ICARs initiative programme launched on 16th July 2012 is a web portal which ensures harnessing the power of scientific knowledge and technology innovation for strengthening agricultural production system in NE region, Rice Knowledge Management Portal(RKMP) is also an ICARs initiative launched on 16th June 2009, for offering advisory services exclusively on rice cultivation. It mainly offers information on trade knowhow, weather information, contingency

plan, mandi price and recommendation of paddy varieties and helps the user in spotting the nearest research or extension office.

National Innovations on Climate Resilient Agriculture (NICRA) is a network project of the Indian Council of Agricultural Research (ICAR) launched in February, 2011. It aims to enhance resilience of Indian agriculture to climate change and climate vulnerability through strategic research and technology demonstration. Knowledge based Resources Information Systems Hub for Innovations (KRISHI) in agriculture, is an initiative of Indian Council of Agricultural Research (ICAR) to bring its knowledge resources to all stakeholders at one place.

2. Agricultural Technological Application Research Institute (ATARI)

Indian Council of Agricultural Research (ICAR), Ministry of Agriculture, Government of India launched the Lab to Land Programme to commemorate its Golden Jubilee during 1979. Agricultural Technological Application Research Institute (ATARI) was established during September 1979 as Zonal Coordinating Unit, Zone VIII at Tamil Nadu Agricultural University, Coimbatore to monitor the activities of Lab to Land Program.

Subsequently, the unit was shifted to Bangalore in September 1981. Since 1986, this unit was given the additional responsibility to monitor all the ICAR Projects under the Division of Agricultural Extension located in this zone.

There are 11 ATARIs working in the country. It plays the role of coordination and monitoring with headquarters at Ludhiana, Jodhpur, Kanpur, Patna, Kolkata, Guwahati, Barapani, Pune, Jabalpur, Hyderabad and Bengaluru.

The Zone No. VIII comprising the states Karnataka, Kerala, Tamil Nadu, Goa and Union Territories of Puducherry and Lakshadweep. Presently the institute is located at Hebbal, Bangalore, in Karnataka state.

3. National Institute of Agricultural Extension Management (MANAGE)

MANAGE, which is located near Hyderabad city, is an autonomous organization established by the government in 1987. The mandate of the organization is to assist the central government and the state governments to improve their pluralistic extension systems by bringing positive changes in policies, programs, and personnel skills. Main activities undertaken by the institute are extension capacity building, research, consultancies, education in management, and documentation. It also offers two post-graduate diploma programs, one in general management and the other in agricultural extension management.

MANAGE is responsible for implementing the Agri-Clinics and Agri. Business Centres Scheme (ACABC), which aims at providing value-added extension services to the doorsteps of farmers by

agricultural professionals. The scheme involves two-month residential training to eligible agricultural professionals, one-year post training in handholding support, start-up loans by banks and subsidy by the National Bank for Agriculture and Rural Development (NABARD). MANAGE having well-equipped modern training infrastructure. Its training programs are open to both public and non-public stakeholders.

There are six nodal training institutes under Agri-Clinics and Agri-Business Centres (AC&ABC) scheme in Karnataka namely as 1. University of Agricultural Science (UAS) GKVK, Bengaluru – 560065.; 2. Sriram Prathisthan Mandal Lokmanagl ACABC Center, Belgum- 590001.; 3. Sri Sri Institute of Agricultural Technology Trust 21st KM, Bangalore – 560 082.; 4. ACABC Scheme Department of Agriculture, University of Agricultural Sciences (UAS), Dharwad - 580 005.; 5. AC&ABC Scheme, University of Horticultural Sciences [UHS], Bagalkot-587103.; 6. Bio Technologies Ltd., Lalbagh Road, Bengaluru–560 027.

In addition, a one-year Diploma Program in Agricultural Extension Services for Input Dealers (DAESI) was started in 2004 for imparting formal agricultural education to the dealers. There are 69 implementing agencies in order to provide diploma programme and objective to transform practicing input dealers into para-extension professionals thereby strengthening the agricultural extension system so as to enable these input dealers to serve the farmers better.

Some of the Research and Education institutes spread across the states in order to conduct research and provide solution and advocacy to farming community namely Indian Institute of Horticultural Research, Bangalore; Project Directorate on Animal Disease Monitoring and Surveillance, Hebbal, Bangalore; National Institute of Animal Nutrition and Physiology, Bangalore ; National Bureau of Agriculturally Important Insects, HA Farms Post, Hebbal, Bangalore; Directorate of Cashew Research; Darbe, P.O. Puttur, Dakshina Kannada.

4. State Agricultural Management and Extension Training Institutes (SAMETI)

There are SAMETI's in most Indian states and they are autonomous state level institutes with a mandate of conducting training courses on new agricultural technologies, extension management, gender issues, extension reform and new information technologies. SAMETIs provide extension management training for extension agents and functionaries for all the line departments, including how to make extension more bottom up, farmer-led and market driven. Apart from providing training, these SAMETIs also facilitate infrastructure in conducting workshops and reviews.

Objectives

- To organize the Human Resource Development activities for the stakeholders of ATMA
- To provide capacity building to the extension functionaries
- To develop management tools for improving the effectiveness of agricultural extension

III. Other Public Agricultural Extension System

1. Krishi Vigyan Kendra (KVK)

On the recommendation of the Education Commission (1964-66), discussion by the Planning Commission and Inter-Ministerial Committee, and further advice by the committee headed by Dr. Mohan Singh Mehta appointed by ICAR in 1973 the idea of establishment of Farm Science Centre (Krishi Vigyan Kendra) was developed.

This has resulted in the increase of 706 KVKs till date which include 458 under State Agricultural Universities (SAU) and 18 Central Agricultural University (CAU), 64 under ICAR Institute, 105 under NGOs, 3 under public sector undertaking, 36 under State Governments, 3 under central university, 8 under deemed university and the remaining 5 under other educational institutions. (www.icar.org.in/content/agricultural_extension_division)

There are 33 KVKs working in the Karnataka state, which 26 under SAUs, 5 under NGO, 2 under IIHR comprising 33 KVKs throughout the state. (https://icar.org.in/content/krishi-vigyan-kendras-karnataka)

Function

Information flows from the universities and research institutes to the KVKs, which are then tested for farmer demonstrations and trainings.

Activities

- Organizing vocational training programmes.
- Providing soil, plant and water testing laboratory facilitates.
- Setting up of demonstration units.
- Production of quality seeds, planting materials and bio-control agents.
- Providing advisory and consultancy services.
- Conducting need-based training programmes.

2. State Agricultural Universities (SAUs)

The noble activity of SAUs facilitates in bridging the identified technological gaps existing with the farmers. The ultimate goal of this important function of the University is to enhance the sustainable net income of the farmer. There are about 64 State Agricultural Universities in India and most of them are involved "Trifold activities namely extension work, education and research".

In order to facilitate to reach the technology researched from research institute to farmers. There are various initiatives taken by four State Agricultural Universities, one Horticultural University and one Veterinary, Animal and Fisheries University of the Karnataka state.

Table 1. Various initiatives taken by SAUs in Karnataka

Sl. No	University/ College	KVK	ATIC	STU	BTU	EEU	CRS	FIU / FTI	ICT	Other
1	UAS Dharwad	✓	✓	✓	✓	✓	✓	✓	KCC	Raitha Chetana Sahayavani
2	UAS Bangalore	✓	✓	✓	✓	✓	---	✓	*e-krishiseve* web portal	
3	UAHS Shivamogga	✓	✓	✓	✓	✓	---	---	✓	Negila Midita farm magzine
4	UAS Raichur	✓	✓	---	---	✓	---	---	*e-Sap*	
5	UHS Bagalakot	✓	---		---	✓	---	---	✓	
6	KVA&FU Bidar	---	---	---	---	✓	---	---	✓	10 (Research and information Centre)

The University of Agricultural Sciences, Dharwad was established on October 1, 1986, Six Agriculture Extension Education Centres, six Krishi Vigyan Kendras, one Staff Training unit, one Agricultural Technology Information Centre (ATIC), one Bakery training Unit, one Krishi Community Radio Station (KCRS), one Kissan Call Centre and Publication Centre at head quarter. The University has its jurisdiction over 7 districts namely Bijapur, Bagalkot, Belgaum, Dharwad, Gadag, Haveri and Uttar Kannada in northern Karnataka. The directorate is involved in dissemination of farm technology through technical bulletins, booklets, leaflets, folders, posters and through radio and TV channels.

i. Agricultural Technology Information Centre (ATIC)

The ATIC is a constituent unit of the directorate which serves as a "Single Window Delivery System" to help farmers and other stake holders by providing solutions to location-specific problems and making all technological information, along with technology inputs, available.

Services of ATIC

There are three ATICs in Karnataka namely ATIC, UAS Hebbal, Bangalore, ATIC, IIHR, Hesaraghatta, Bangalore ATIC, UAS, Yettinagudda campus, Dharwad.

ii. Farmers Training Institute

The Farmers' Training Institute (FTI) of the University of Agricultural Sciences, Bangalore (UAS B) was

established in the year 1967 and also UAS Dharwad (UAS D) with the main objective of imparting training for farmers. The Institute organizes both institutional and peripatetic training programmes.

Benefitting stakeholder

Department of Agriculture (Bhoochethana, INSIMP and ATMA), Command Area Development Authority (CADA)-Mysore, State Institute of Rural Development (SIRD)-Assam, OSSOPCA (Odisha Agriculture Department), JSS Institute, Swashakthi (KSWDC), ICRISAT, Mahila Samkya, NGOs.

Objectives

- To impart trainings on agriculture and allied subjects
- To provide farm advisory services to the farmers of Bangalore district

Activities

- Institutional trainings
- Off-campus training programmes (Village based)
- Link workers training programmes both in institutional and village level
- Specialized trainings as per the need of client in departments of Agriculture, Horticulture, Animal Husbandry, Sericulture, Watershed Management, etc.
- Workshops, Farmers – Scientists interaction, Seminars etc.
- Conducting front line demonstrations in Bangalore Urban district under Integrated Farming System Demonstrations (IFSD), Rashtriya Krishi Vikas Yojana (RKVY) programmes etc.

iii. Extension Education Units (EEUs)

The Extension Education units (EEUs) were started during 1970 based on the success of Pilot Extension Project started during 1967. This unit is the nodal agencies for conducting field extension programmes. The unit motivates the farmers is to adopt newly developed farm technologies in an integrated manner with the goal of enhancing income of farmers from a unit area of land.

Activities

- Providing farm advisory services of various farming aspects
- Conducting First stage demonstrations, Block demonstrations, and frontline demonstrations, demonstrations on dairy, poultry, piggery, fisheries and sheep rearing activities.
- Conducting coordinated programmes like animal health camps, home science and value addition activities with other agencies.
- Conducting field verification trials.
- Conducting seminars, training programmes, field days etc.

1. **DoE, UAS, Bangalore**

- EEU Naganahalli, Mysore
- EEU Kolar

2. **DoE, UAS, Dharwad**

- AEEC Dharwad
- AEEC Bijapur
- AEEU Bagalkot
- AEEC Gadag
- AEEC Sirsi
- AEEC Arabhavi, Belgavi

3. **DoE, UAS, Raichur**

- AEEC Bheemarayanagudi, Raichuru
- DoE, UAHS, Shivamogga
- EEU, Kathlagere, Davanagere
- EEU, Ponnampet, Kodagu

iv. Raita Chethana

It is a unique initiative taken by DIMHANS, Dharwad, under the aegis of Dr. Raveesh B N and his able team, in collaboration with the University of Agricultural Sciences, Dharwad.

The main objective of the initiative

To stem the rising incidences of suicide amongst farmers by identifying psycho-social factors leading to deliberate self-harm and delivering a prompt and an effective solution

v. Krishi mela and Agricultural fairs

The Directorate of Extension organizes four days Krishi mela at the University headquarters every year, in which nearly 6 lakhs farmers and general public participate. Further, the Directorate organizes the field days at various farmers' fields through Krishi Vigyan Kendra's and Extension Education Units every year.

vi. Staff Training Unit

The Staff Training Unit (STU) was started in 1974 with a view to promote professional competency among the staff of various organizations within and outside the State of Karnataka. The STU is organizing institutional training courses; field-oriented training programmes for various personnel of private, government and quasi-government organizations.

Mandates

- To identify the training needs
- To develop appropriate training modules
- To arrange the training programmes
- To serve the staff of developmental / line departments, NGO's, Banks and other organizations

vii. Bakery & Value Addition Centre (B&VAC)

Bakery Training Unit is working under the Directorate of Extension, University of Agricultural Sciences, Bangalore. It was started during 1968 as Bakery Training Unit sponsored by US Wheat Associates, New Delhi, with the main objective to impart skill-oriented training programmes in bakery. The unit has been imparting training in bakery since last five decades for professional bakers, industrialists, SHG's members, youths, housewives etc. to develop entrepreneurship and to create self-employment opportunities.

viii. National Agriculture Extension Programme (NAEP)

National Agriculture Extension Project (NAEP) was started during the year 1982-83. It is a nodal agency for providing training and updating the knowledge and skills of field extension functionaries of Karnataka State Department of Agriculture and other line departments.

ix. Distance Education Unit (DEU):

The University of Agricultural Sciences, Bangalore took a lead in starting the correspondence course during the year 1974, on production technologies. To motivate the participant farmers to adopt knowledge gainfully in their field.

Mandate

- To diffuse technical "Know-how" to the literate farmers.
- To disseminate information at convenient time and place of the farmers.
- To teach farmers who are residing at remote places.
- To provide technologies to the famers.
- To encourage Distance Education in Agriculture.

Source: syngentafoundation.org

IV. Non-Government Organizations

4.1 Private sector

Several moves have been made in India towards privatization of agricultural extension services mainly through experimental and pilot projects, as well as schemes during the past decade yet the bulk of extension services remain by and large public and free of charge for farmers.

It revealed through the NSSO (2005) assessment, there are a large number of agricultural companies (about 2,80,000) but none may be called as a full-fledged private agricultural advisory company, Whatever provision of private extension services is done, it is done by farm inputs suppliers, consulting firms, and contracting companies. The forms of service obtained by farmers through payment include contract farming (mostly by commercial agricultural companies), marketing of high value crops (usually by commercial export companies), value addition (normally by agro-processing companies), trouble shooting on farms (mostly by consultants), and charge-based services centres for farmers (usually by private agricultural companies).

The below namesare of a few private agricultural companies, which provide one or more services like contract farming, agro-processing, inputs supply, consulting, multi-services, and export, are as follows:

- Indo-American Hybrid Seeds
- ASPEE India
- Agro Tech
- Good Earth
- Green Valley Plantations
- Mahindra Shubh labh Services, Ltd.
- ITC Limited - India
- CAICO
- Rasi Seeds www.rasiseeds.com
- DuPont India
- National Agro Industries
- Poabs Organic
- Phalada Agro Research Foundation
- Advanta India, Ltd.
- Monsanto India Ltd.

Some private sector agribusiness and input manufacturing companies also undertake direct extensional activities in Hyderabad based, Nuziveedu Seeds has done a lot of extension related work through its program 'Subeej Krishi Vignan'. These extension activities are to gain importance of their product brand and to help the famer realize higher production (and thus returns) through necessary pre-sowing preparation, optimum seed rate, correct agronomic practices application of nutrients and harvesting techniques. In the case of fertiliser companies, especially large cooperatives like IFFCO (Indian Farmers Fertiliser Co-operative Limited) and KRIBHCO (Krishak Bharati Cooperative), its extension activities include a wider range of interventions, such as conducting farmer meetings, organizing crop seminars, arranging for soil testing facilities, adopting villages etc.

Tata Chemicals initiated Tata Kisan Kendras with the objective of empowering and enabling farmers

towards improved agronomic practices and higher returns. DCM Shriram, which also produce seeds and fertilizers. It has established Hariyali Kisan Bazaar (HKB), a chain of agriculture input retail stores which also offered marketing support for selected produce. Farmers could also access technical information, information on Agri-inputs and banking and farm credit facilities through the HKBs.

AGROCEL an agro-chemical company, provide inputs and necessary technical guidance to farmers through its "Agrocel Service Centres" in many states. The commercial model adopted by both Tata and DCM Shriram proved unsustainable, leading to closure of the majority of centres initially launched. A similar work by Mahindra Shubh Labh, which was closely to the of Tata centres.

ITC, another agribusiness major, launched its e-Chaupal initiative in extension over a decade ago. A VSAT-enabled internet connection at the village level allowed farmers to check prices in the local mandis before they move their produce for sale. This helped to reduce information asymmetry to a great extent and forced the mandis to adopt fairer price discovery processes. ITC also purchased small quantities of selected commodities at these centres for its own trading and processing needs.

E-Chaupal initiative also allowed farmers to check prices in the local mandis before they move their produce for sale. This helped to reduce information asymmetry to a great extent and forced the mandis to adopt fairer price discovery processes. The e-choupal also provided access to information about weather and innovative farming practices to the farmers. Other initiatives taken by ITC include the "Choupal Saagars" and "Choupal Pradarshan Khet" (CPK). Choupal Saagars mainly comprise of collection and storage facilities which create a hypermarket in rural areas that serves multiple services under one roof. Choupal Pradarshan Khet is a demonstration plot which helps farmers to learn best agronomic practices to enhance their farm productivity.

Companies like Pepsico and Heritage Foods, which undertake contract farming of potato and vegetables respectively, also work closely with farmers to provide inputs, technical advice and marketing services. None of these models, however, operate at a scale of over a few thousand farmers at the limit, thereby restricting the scope of impact that they make on the wider farming ecosystem.

4.2 Non-Government Organizations (NGOs)

India has many NGOs, about 78,558 actively working NGOs(including Rural development, poverty alleviation, women empowerment, food security and hunger) in India (https://ngodarpan.gov.in/index.php/search/) and Karnataka State has 277 NGOs, (Shivamogga and Chikmagaluru having 19 and 15 NGOs respectively) their activities including food and agriculture sectors too. Some have done very useful development work. However, like in most developing countries, NGOs in India were involved in different aspects of extension work, mostly as a part of agreement with the government or donor funded agricultural and rural development projects. Names of a few NGOs claiming to perform extension or extension type activities in Karnataka are as follows:

- Sri Kshetra Dharmastala Rural Development Programme (SKDRDP)
- Bharatiya Agro Industries Foundation (BAIF)

- Chaitanya Rural Development Society (CRDS)
- Association of Women Entrepreneurs of Karnataka (AWAKE)
- Mysore Resettlement and Development Agency (MYRADA)
- Society for Advancement of Village Economy (SAVE)
- Self-Employed Women's Association (SEWA)
- Jana Spandana Organization
- Vikasana Foundation
- Deshpande Foundation
- Vrutti Foundation

Box 3. Good Practice Example of NGO-Organized Agricultural Services

The Bharatiya Agro Industries Foundation (BAIF) was established in 1967 by Manibhai Desai. Now, this NGO is renamed as the BAIF Development Research Foundation. The foundation and its associated organizations presently offer a range of extension and agricultural-related services to rural families in 45000 villages in 12 states in India. BAIF is unusual in that it maintains a small research programme that helps support many of its extension activities, particularly, in the area of livestock development, as well as land and water management. Most of the funding for these different extension activities comes from government contracts to provide specific services to farmers.
(http://www.globalfoodchainpartnerships.org/india/Presentations/ ng_hegde.pdf)

Box 4. NGO's are boon for rural development...

Aluvelamma w/o Late Venkateshappa, is a member of Saraswathi Mahila Sangha in Malakanahalli village of Malur Taluk, Kolar District. A widow with three children, life was indeed difficult for her especially feeding her family on her irregular wages as a daily wage worker. She says that "My fortune has been changed" due to a program of HUF, NABARD and MYRADA Watershed Development Program that supported landless families like me to improve livelihoods by providing financial support. She decided to carry out and bought a high breed cow on 08-10-2012 costing Rs. 35,000. She received Rs. 10,000 as grant from NABARD, a loan of Rs. 15,000 from Sanghamithra and put in Rs. 10,000 on her own.

Impact: In 2016, the yield was 18 litres of milk per day (Rs. 20 per liter from dairy and Rs. 4 supporting
(https://myrada.org/kaamadhenu-the-granter-of-wishes-and-wealth/)

4.3 Farmers-based associations, cooperatives, Organizations and societies

Farmers Associations, Co-operatives, organization and societies in India have been quite active for years in ventures like self-help for development, specific commodity production, marketing, collective bargaining and many other purposes. Some of these associations have played important role in poverty alleviation and rural women empowerment. There are A few examples of farmers' associations are given below.

- Federation of Small Farmers' Associations of Khaddar Area,
- North India & Sunstar Overseas, Ltd.
- Turmeric Farmers Association of India
- Farmers' Association Pomegranate
- Organic Farming Association of India (OFAI)
- Farmer Interest Groups (FIGs), Women Interest Groups, Self-help Groups (SHGs)
- United Planters Association of Southern India (UPASI)

Box 5. United Planters Association of Southern India (UPASI)

UPASI, an apex body of tea, coffee, rubber and cardamom growers in South India, has a long tradition in leadership, research and extension services in the plantation industry. It is engaged in research, statistical analysis, commodity affairs, industrial relations, taxation, finance, legal issues, publications and public relations and represents the growers' interest in national and international forums. It also organises, conferences, seminars, workshops and rural development programme. UPASI has established a tea research foundation and has seven advisory centres for transfer of technology. It also has a Krishi Vigyan Kendra (KVK) sponsored by ICAR.

Box 6. Organizational innovations doubled the achievement motivation of farmer!

Achyutha son of Hanumatappa is a young farmer from Baranduru village of Bhadravathi taluk, Shivamogga district of Karnataka state. He possesses 2 acres of agricultural land in which he is cultivating paddy in 1.5 acres and in the remaining half acre, he has 20 coconut palms. He is maintaining two dairy animals and getting an income of Rs. 50, 000 per annum by selling milk. Before the establishment of Malenadu spice and nuts producers' company private limited in 2016, he was serving as tractor driver along with farming. Once after producer company introduced with the neera processing technology, training has been given to coconut farmers on acquiring skill of tapping neera by climbing coconut palm with help of climbing friendly equipment, he shifted from traditional method of selling coconut products like copra and

tender coconut to selling of neera, a by-product of coconut with the help of climbing device given by producer company. In traditional method selling coconut he had problem of fluctuations in the market price and also had burden of transportation cost. But once after he started selling neera to the producer company he is able to earn Rs. 1000 Out of 40 litres of neera from 20 palm per day. Which accounts Rs. 30,000 per month. Earlier he was able to earn only 8000 per month out of rental driving of tractor now is engaged with earning almost every day. The training on neera extraction skill trained by the malenadu spice and nuts producer company transformed him as an economically stable coconut farmer.

V. Information and Communication Technology (ICT) led agriculture extension

Radio and television programs for farmers have been broadcast and telecast on regular basis for almost five decades. India is one of the top two countries which get ICT related outsourcing contracts worth millions of dollars from the USA. The city of Bangalore is considered as the Silicon Valley of India. According to the World Bank, in 2011, the number of mobile cellular subscriptions (per 100 people) in India was almost 72. During the same year, the number of Internet users (per 100 people) in the country was 10.07, but largely in urban areas.

ICT (Information and Communication Technology) led Extension, an important reform undertaken in recent years by the Ministry of Agriculture at the national level has been the increasing use of modern technologies and communication strategies to help educate farmers. ICT has significant potential to reach large numbers of farmers in a cost-effective manner. It can also facilitate two-way information flows between farmers and the extension agencies.

5.1 Some of the ICT initiatives for extension advisory in Karnataka

Farmers Portal: Farmers Portal is a platform where farmers can access information on crop insurance, storage, crop advisories, extension activities, seeds, pesticides, farm machinery, fertilizers, market prices etc. Farmers can download a handbook which provides details of schemes and guidelines of various schemes and programmes.

M-Kisan: M-kisan is an SMS portal that enables information to farmers in the local language. There are several free, mobile based applications (or apps as they are commonly referred to), such as Kisan Suvidha, Pusa Krishi, Agricultural Market, Bhuvan Hailstorm etc. providing various types of information to farmer through mobile phones.

Kisan Call Centre: The GOI, Ministry of Agriculture launched the scheme "Kissan Call Centres (KCCs)" on January 21, 2004. These toll-free, phone based agricultural advisory services in local languages are operational in most States with financial assistance provided by Government of India. A single toll-

free number (1800-180-1551) is offered to farmers for seeking information and advice on a range of agriculture related issues. Subject matter specialists are available at these centres to respond to calls, in case the queries require specialist consultation, a call back facility is also operational. In several States, the KCC has achieved fairly impressive levels of penetration. 376 people are employed by 14 KCCs that cater to farmers from 26 states. Queries which cannot be answered by Farm Tele Advisor (FTAs) are transferred to higher level experts in a call conferencing mode. These experts are subject matter specialists of State Agriculture Departments, ICAR and State Agricultural Universities and the KCC state center of Karnataka is located at UAS Dharwad.

Kisan TV Channel: A dedicated 24-hour television channel on agriculture was launched by the national broadcaster, Doordarshan in 2015. Delivering content in several major regional languages including Hindi, the Kisan Channel provides real time information on inputs, farming techniques, water conservation etc. to the farmers. Despite criticism by experts for the lack of innovation and attractive production values, Krishi Darshan was listed among the major sources of agricultural advice by farmers (NSSO 70th Round). The majority of those who watched this programme also found the content useful.

Community Radio Stations: Community radio stations are narrow broadcast channels which seek to generate locally relevant content and advice within a small area (typically about a few hundred villages). They are an effective means of dissemination of local knowledge and good practices as there will be farmer led extensions which help to showcase success stories of local region, gains credibility in content and mix entertainment, news and other non-technical content along with their core mandate of agricultural extension.

The first Community Radio Station in Karnataka state was established in UAS Dharwad campus on May 17, 2007. The Community Radio Station is named as Krishi Community Radio Station (KCRS), the catch line of this channel is "Raitarinda- Raitarige" (from farmers to the farmers). The programme is being broadcasted for four hours daily (two hours each in the morning and two hours in the evening). Activities: The programmes of Community Radio Station have helped in providing location of specific production information to the farmers based on day to day weather report, market analysis, out -break of pests and diseases etc.

India has made impressive progress in the application of ICT to its rural and agricultural development programs. Dozens of agricultural commodities focused and technical discipline based public and private IT networks exist, with many of them reaching the village level.

5.2 Examples ICT initiatives by private sector in India are as follows:

Bhoomi: Under this program, 20 million land records of 6.7 million land owners in 176 taluks of Karnataka State have been computerized. Other states have followed the suit.

E-Choupal: The program links farmers directly to agricultural and aquaculture products companies

dealing in soya, coffee, prawns etc. for the purchase of these commodities at competitive rates thus eliminating the middlemen. The program's principle is to inform, empower and compete. Presently, there are more than 6,500 e-Choupals across 10 states in India.

I-Kisan: IKisan has been developed by the Nagarjuna Group, based in South India, with interest in agriculture, fertilizers and insecticides, among other areas. It is a comprehensive agriculture portal addressing the information, knowledge and business needs of farmers, traders and farm input agencies.

Agriwatch: is said to be the largest agribusiness portal in India. It enables access to agribusiness information covering more than 15 sub-sectors of agricultural and food industry. The website carries daily, weekly and fortnightly trade research reports.

aAqua: It is one of the initiatives of the Indian Institute of Technology, Bombay presenting an online multilingual, multimedia agriculture portal for disseminating information from and to the grassroots agricultural communities. The program integrates multiple databases.

DEAL: DEAL is an initiative of the Indian Institute of Technology, Kanpur. It is an ICT enhanced network built on an existing framework of tele-centers in rural institutions like village schools, and village level agricultural extension centers. It constitutes a digital knowledge base for the farmers and agricultural practitioners.

E-Sagu: It is an IT-based personalized agricultural extension system for disseminating expert advice on agriculture to the farmers in a timely manner.

Video based approach

Digital Green participatory video project incubated as a Microsoft research project in Bangalore, India, in 2006, the project was part of an effort to test different ways of using technology for social development. This project focused specifically on testing the use of participatory video as a means of agricultural extension. The approach was proven to be substantially more effective as a means of extension than existing conventional agricultural extension programmes. Digital Green has partnered with over 50 partners in over projects since 2008. Digital Green has implemented projects in nine states in India, and in 15 other countries including, Afghanistan, Nigeria, Nepal, Papua New Guinea, Ethiopia, Ghana, Niger, Burkina Faso, Ivory Coast, Guinea, Tanzania, Mozambique, Senegal, Malawi and Guinea. (Gandhi *et. al*, 2009)

20 Location: South-Asia and Sub-Saharan Africa
ICT used: Video, data management framework
Area of work: Extension services- nutrition and agriculture
Target group: Rural farming communities
Stakeholders: Smallholder farmers, extension workers
Timeframe: Since 2006

Some of the ICT initiatives and approaches used in the India:

Category	Types Examples	
ICT in Extension - Tools		Earliest / Popular efforts
	Computer Networks	Gyandoot (Madhya Pradesh), Warana Wired Village Project Information Village Project e-choupal models
	Audio- Video Conferencing	MANAGE's video conference facility
	Community Radio	Deccan Development Society, Sauras Crane of Kutch (Gujarat based NGO – name translated), UAS- Dharwad, so many SAUs
	Mobile Telephony	IFFCO`s Kisan Sanchar Limited, RML (Reuters Market Light)
	Landline Phones	Kisan Call Centres
	Automated Tools	Automated Milk Collection Centres (tools) of AMUL
	Blended	Agrisnet of State Departments
ICT in Extension - Processes	Hub & Spokes Model	e-Sagu of IIIT Hyderabad, Kissan project of IITM, Kerala
	Kiosk Model	Common Information Centres/ Common Service Centres, ATIC
	Knowledge Management Process	Rice Knowledge Management Portal, Agropedia, Digital Green
	Open and Distance Learning (ODL) process	TN Agritech Portal, IGNOU
ICT in Extension - Integration	Integrating ICTs into existing extension systems	ICT efforts of KVK`s such as Baramathi
	Optimizing with minimum change in existing extension systems	ICT-ATMA Integration RKMP into existing AICRIP-extension
	Maximizing with maximum change in the extension systems	Yet to be developed (not sure yet about the feasibility)

(**Source:** Anonomous, 2011)

Mobile based Applications in animal husbandry in Africa

I-Cow is an SMS (text message) and voice-based mobile phone application for small-scale dairy farmers in Kenya. It is designed to run on both low-end and high-end mobile phones. It's virtual veterinary midwife, helping farmers track the estrus stages of their cows, while giving them valuable tips on cow breeding, animal nutrition, milk production efficiency and gestation. The app prompts farmers on vital days of cow's gestation period; helps farmers find the nearest vet and AI providers; collects and stores farmer milk and breeding records and sends farmers best dairy practices. The text messages and voice prompts are sent to customers within the 365-day cow cycle (Forbes, 2011).

Another smart-phone based mobile app is Vet Africa designed for farmers and vets in Africa. This has been found to be effective in supporting the diagnosis of cattle diseases in a range of settings in sub-Saharan Africa (CVER, 2015).

Mobile-based agro advisory services (MAAS) in India

There are several mobile based initiatives started in Karnataka in order to provide advisory services. Available literature was reviewed to search the various MAAS models in India some of successful models are as following: e-Krushika, KMAS, KCC, Reuters Market Light , Airtel Green Sim , IFFCO Kisan Agricultural App, m-KISAN, m-KRISHI, Behtar Zindagi, Awaaz De, Interactive Information Dissemination System (IIDS), Kisan Call Centres (KCC), Digital Mandi by BSNL, Voice Krishi Vigyan Kendra (VKVK, I-Cow, Electronic Solutions against Agricultural Pests (e SAP), Kisan Mobile Advisory by ICAR-KVK's , Hello Uttam by Chambal Fertilizers and Chemicals Ltd. , Krishi Mitra , Kisan Suvidha , Intelligent Advisory System for Farmers (IADS) , Fasal, Lifelines India, Maha agri SMS and Havaamaana Krishi by UAS Dharwad.

Mobile Solution: An app for agro advisory services

The project is working with local partners like Kisan Sanchar limited, IKSL, Farmers cooperatives of some of the villages and also the state agricultural department, KVKs and national research institutes and universities to provide climate information and agro advisories to farmers. The information's are delivered to the farmers in form of voice messages on their mobile phones on weather, climate smart technologies and practices, seed, nutrient management, livestock management, pest management etc. Farmers have access to helpline numbers to contact back for detailed or follow-up questions.

These queries are also used as feedback to develop the agro-advisory messages. Farmer to farmer messages are also transmitted, if benefits or threats faced by some farmers need to be passed on to other farmers in that geographical area. All these efforts helped to create a feedback loop for more timely, usable and actionable agro advisories.

Statement of Problem

India has a complex extension network comprising conventional and modern ICT-based programs, projects, initiatives, centres, services and models involving government departments at the national, state, district and village levels, as well as universities, private sector, research institutes, semi-autonomous and autonomous bodies, and civil society institutions (NGOs). This situation puts heavy responsibilities on the national level extension department for the policy guidance, coordination among so many actors and the assurance of advisory quality. Although an impressive progress in ICT applications to the agriculture sector, however 71 per cent Indian rural literacy (Economic times, 2015) but lack in accessing modern technology especially in computer knowledge making farmers lag behind in benefitting from these applications.

Due to changing face of agriculture, farmers have to make a number of complex decisions now. Therefore, various extension reform principles and interventions for deciding any type of extension system should keep in mind sharp focus regarding the aspects of regional specific and need based extension as well as popular participation, gender sensitivity, client focus, demand driven, pluralism, decentralization, monitoring, evaluation and impact assessment and institutional linkages.

Institutional linkage beyond research and extension is also weak. Woman farmer's access to extension services remains limited due to lack of women extension agents and the coverage of resource poor small and marginal farmers needs expansion and improvement. Among all the donors that have provided assistance to extension in India, the World Bank deserves the most credit. The assistance provided by the Bank from 1960s till now has not only strengthened the public extension services but has introduced a number of key extension reforms.

Here it is important to understand while using ICT-based methods for supporting agricultural extension is extension alone is not sufficient to sustain an 'information shop' at the village or even sub district level. The information supply domain has to be much larger and dynamic so as to offer

value-adding information like market prices, local topical information, weather forecasts etc. In addition, the packaging of the information becomes very important- it has to be more visual and more complete.

All these evidences discussed above regarding extension system in the country reveals the wide diversity in extension provision and the wide variation in the way farmer access various extension sources in different states.

Hence, the present study will focus on how farmers are benefited by the extension services offered by various actors and the role of various actors of extension system in improving socio-economic status and production of farm families. Thus, in order to gather insights into these issues, the present study is proposed to be conducted with the following objectives:

1.2 Objective of the study

The overall objective of the present study is to know the good extension practices in agriculture accessed by the farmers in the selected study area.

Other specific objectives of the study are:

- Mapping out of various good agricultural extension practices
- To identify the major extension service providers and their approaches involved in advocacy to the farmers
- To study the impact of agricultural extension practices on farmers

Impact of good extension practices

Impact Evaluation

Impact evaluation seeks to measure lasting impacts of programs or projects on important indicators such as crop yields, farm profitability and family income, or livelihood improvement, socio-economic change. Such assessments also may focus on broad and long-term program effects, such as changes in ecological, social, economic, or community conditions.

Impact evaluation attempts to assess the changes that can be attributed to a particular intervention, such as a project, program or policy. These changes can be those intended or expected and also the unintended ones. In contrast to outcome monitoring, which examines whether targets have been achieved, impact evaluation is structured to answer the bigger question: has there been any change in the situation which the intervention was planned to correct and how has the intervention impacted the lives of the intended beneficiaries? This involves counterfactual analysis, that is, a comparison between what actually happened and what would have happened in the absence of the intervention. The key challenge in impact evaluation is that the counterfactual cannot be directly observed and

must be approximated with reference to a comparison group. Impact evaluations seek to answer cause-and-effect questions. In other words, they look for the changes in outcome (s) that are directly attributable to a program. Such analysis helps in evidence-based policy decisions and understanding what works, what doesn't, where, why and at how much cost?

The impact evaluations go for in-depth analysis of the process of impacting as well. This has received increasing attention as aids to policy making in recent years in both developed and developing country contexts. It is an important component of the armory of evaluation tools and approaches and integral to global efforts to improve the effectiveness of aid delivery and public spending more generally in improving living standards.

Study applies 'Bennett's hierarchy' (Bennett, 197  which describes evidence of extension activity impacts, to the data collected through individual surveys of the participants, beginning at the bottom step with inputs, and progressing to the top – end results. While this model is useful for assessing inputs, activities, outputs, reactions, knowledge, opinions, skills and attitude changes (levels 1–5), it is not rigorous enough to assess practice change and end results at levels 6–7.Second, in order to address the above deficiency, the study employs a different case studies of stakeholders.

Impact Indicators

- Change in crop production
- Change in social status
- Change in Annual income
- Change in expenditure pattern
- Saving pattern

Research Design

- Ex-post facto research design will be used for the present study.
- Mixed Method data were collected from an interview schedule. Primary data will be collected and calculated quantitatively and qualitatively. In quantitative data, data will be collected through measuring things such as impact of good agricultural extension practices on farmers whereas, in qualitative, data will be collected through participant's observation and interviews.
- For the purpose of present study a semi-structured interview schedule will be prepared and focus on group discussions and observation methods will be done to collect the information.
- Secondary data will be collected after reviewing the annual reports, research papers and online published reports, books, magazines etc. It will help to explore different case studies of regarding good agricultural extension practices and role of extension services in the selected districts of Maharashtra to achieve the objectives of the study.
- The primary data will be collected by conducting telephonic conversations and face to face interviews by the respondents.

Issues and constraints faced by Indian Agricultural Extension

1. The major issues before Indian extension system are: how to improve the effectiveness of extension systems? How to serve the small land holders and marginal farmers in diversified farming systems and proper allocation of fund, human resources and its management.

2. XIth FYP recommendations highlights the major constraints as (i) Lack of convergence in operationalization of extension reforms (ii) Lack of provision for dedicated manpower at various levels (iii) Inadequacy of funds (iv) Lack of infrastructural support below district level, and (v) Inadequate support for promotion of farmers' organizations and their federation.

3. The country is also experiencing change in key climate variables, namely temperature, precipitation and humidity which has already started affecting its agriculture and it has to consider adaptive measure to cope with these changes (Government of India, 2015).

4. Today, due to factors such as food price crises and climate change, extension is increasingly recognized as critical for rural development. In a rapidly changing world, food and agricultural innovation system are facing new and increasing complex challenges.

5. Fighting poverty, ensuring food security and improving living standard of farmers. New mechanism to foster development and diffusion of innovation are needed to strengthen the ways in which information, knowledge and technology are developed and disseminated to ensure that the global changes benefit smallholder farmer. Similarly, agricultural extension service operates from the backdrop belief that increased agricultural productivity depends primarily upon the acceptance of improved cultural and technological changes at the rural farm level and that peasant farmers can achieve higher farm yields only if they adopt re- commended scientific farming techniques in place of their traditional practices (Sulaiman, 2012). These could only be channelled through effective extension services which are assessed from the farmers view point. However, extension services in India perform poorly and also due to lack of knowledge in agriculture, farmers fail.

Agricultural extension services can and should play an important role in addressing many of these challenges. Considering the changing nature of agriculture and the evolving challenges, producers currently need a wider range of support, including organizational, marketing, technological, financial and entrepreneurial.

To be successful, farmers require a wide range of knowledge from different sources and support to integrate these different bits of knowledge in their production context.
Though the theory and practice of extension has considerably evolved globally during the last few years, this is yet to make any significant change in the way extension is understood and practiced in the country.

Good practices

A good practice is not only a practice that is good, but a practice that has been proven to work well and produce good results, and is therefore recommended as a model. It is a successful experience, which has been tested and validated, in the broad sense, which has been repeated and deserves to be shared so that a greater number of people can adopt it.

According to GFRAS, the Global Good Practices Initiative aims to facilitate access to information and know-how on agricultural extension for a wide audience of practitioners. It does so by providing Good Practice Notes, which are descriptions of key concepts, approaches, and methods in an easy-to-understand format.

Definition of Good Practices

1. A mechanism, method, process, or strategy that allows extension functions to be more effective and efficient, and contributes to the introduction of innovations to improve skills. (Preissing, 2011)
2. Extension and advisory practices that have successfully engaged men and women farmers and entrepreneurs with limited resources, which are successfully adapted to fit local conditions and the institutional context to establish productive and profitable relationships.

Criteria of Good Practices

The following set of criteria will help to determine whether a practice is a good practice":

1. **Effective and successful:** A "good practice has proven its strategic relevance as the most effective way in achieving a specific objective: it has been successfully adopted and has had a positive impact on individuals and/or communities
2. **Environmentally, economically and socially sustainable:** A good practice meets current needs, in particular the essential needs of the world's poorest without compromising the ability to address future needs
3. **Gender sensitive:** A description of the practice must show how men and women involved in the process, were able to improve their livelihoods.
4. **Technically feasible:** Technical feasibility is the basis of a good practice. It is easy to learn and to implement.
5. Inherently participatory approaches are essential as they support a joint sense of ownership of decisions and actions
6. **Replicable and adaptable:** A "good practice" should have the potential for replication and should therefore be adaptable to similar objectives in varying situations.
7. **Reducing disaster/crisis risks, if applicable:** A "good practice contributes to disaster/crisis risks reduction for resilience.

How good Agricultural extension practices contribute to strengthening the agricultural sector

Good extension design and implementation depends on key factors including decision-makers, extension managers, extension practitioners, educators, trainers, farmers, and end-users. These factors need reliable, evidence-based knowledge about extension practices in order to shape policy; develop strategies and allocate resources; provide effective, adapted, and evidence-based services and support to farmers; and improve the capacity of various factors. These initiatives, practices, and actions contribute to the broader goals of improving livelihoods, food security, and resilience; reducing poverty and risks; and ensuring continued investment in RAS.

To enable the GGP Initiative to support these processes, GFRAS developed a framework to systematically examine existing or promising good approaches to extension and RAS, and their impact on agriculture and rural populations.

Birner *et al.* (2009) framework for designing and analyzing agricultural advisory services defines the fundamental issues that affect RAS and agriculture: governance and structures (RAS provision, financing, coordination, partnerships) ,Management and capacity strengthening (mandate and mission, incentives, training, continuing education, performance), Advisory methods (approaches for learning, targeting, delivery, scaling, technologies used), Cross-cutting issues (gender, youth, climate change, nutrition). (GFRAS Note-2017)

1.3 Problems

Starting with the Green Revolution in the late 1960s, India made significant gains in its agriculture sector, successfully solving the problem of frequent famine threats, and becoming self-sufficient in feeding its growing population. The agriculture sector contributes about 18 percent to the national GDP, and employs about 50 percent of the national work force. India has both irrigated and rain-fed agriculture. Rice and wheat are its most important food and export crops, placing India as the second biggest producer of these commodities in the world. Other crops include sugarcane, vegetables, spices, coconut, oilseed, tuber crops, cotton, tea, rubber and jute.

The country is among the top five largest producers of livestock and poultry. However, most of the crop yields remain low in general; soil fertility keeps declining, irrigation infrastructure and water management are poor, dependence on increasingly unpredictable rains is high, subsistence farming is dominant due to average size of holdings being less than two hectares.

Also, marketing and post-harvest handling of produce are less than satisfactory, and government interventions through subsidies and taxation are distinct. However, in the absence of robust public/ private support system at the ground level farmers face challenges in accessing land, water, inputs, credit, technology, and market. Then, there are emerging challenges like risk and vulnerabilities due to climate change and natural calamities. There are structural and governance challenges too.

1.4 Scope of the Study

Extension is essentially the means by which new knowledge and ideas are introduced into rural areas in order to bring about change and improve the lives of farmers and their families. Extension, therefore, is of critical importance. Without extension farmers would lack access to the support and services required to improve their agriculture and other productive activities. The critical importance of extension can be understood better if its three main elements are considered i.e. knowledge, communication and farm family.

The ultimate objective of both research and extension systems is to increase agricultural production. Their roles of generating and transferring technology are complementary. Research institutions need to have information on the problems, technology requirements and socio-economic and ecological environment of producers to formulate research agendas and to set priorities. Formulating a research agenda based on producers' requirements results in technology that will be more acceptable to users; this also leads to research institutions allocating their resources more efficiently.

As the study mainly focuses on extension practices, it helps in evaluating some new good practices in agricultural extension which can help the farmers by giving those better ideas or better way of understandings for the increase in their agricultural production.

Review of Literature

FAO (2007), Producer Organizations Farmers' and rural producers' organizations refer to independent, non-governmental, membership-based rural organizations of part or fulltime, self-employed, smallholders and family farmers, pastoralists, artisanal fishers, landless people, women, small entrepreneurs and indigenous people. They are based on principles of nondiscrimination, provide a range of services for their members, including market opportunities and empower all their members, women, men and youth.

The POs are grounded on the principle of collective action among potential beneficiaries. Collective action occurs when individuals voluntarily cooperate as a group and coordinate their behavior in solving a common problem. These can assume a variety of forms, from small, grassroots associations to unions, federations and chambers of agriculture. They range from formal groups covered by national legislation, such as cooperatives and national farmers unions, to loosen self-help groupings and associations.

Pal and Jha, 2007 conducted a study on private sector participation in agricultural research and development and revealed that recent estimates the business funding (largely private) for agricultural research and development constituted about 11 percent of the total research and development funding. The largest private investment occurred in chemicals (pesticides and fertilizers) and food processing, followed by seed and machinery. More recently, growth has been in plant breeding and biotechnology, animal health and poultry. While this has added to improved flow of new technologies, there are concerns on the higher costs of these technologies and, therefore, the restricted access and small farmers being by-passed.

Chandragowda, 2011 conducted survey and revealed that, in terms of number of staff and organizational reach, the public sector extension staff of the Department of Agriculture (DoA) of the states, dominate extension provision in India. Majority of the states have their staff up to Block level. Only 6 states have their staff up to the village level and 11 states have extension manpower up to Panchayat level. "Data from 27 states indicate that 36% of the posts are vacant in the DoA. Out of the 143863 positions in DoA, 52575 posts are vacant. Only 91288 posts are filled".

Glendenning *et al.* in 2010 depicted that most of the extension personnel that are present perform multiple roles. Their visits to the field are irregular as the service is pre-occupied with the implementation of government schemes linked to subsidies and subsidised inputs. "Although farmers require information for the whole food and agriculture value chain, the public extension system largely concentrates on on-farm activities"

Geethalakshmi *et al.*, 2012 discussed the challenges in case of small-scale aquaculture: lack of community approach continues to discourage input suppliers and marketing agents to service this

sector effectively. Limited access to information and lack of adequate training programmes further constrain those dependent on the fisheries sector).

Ulman et al, 2008 revealed that fishermen mostly need training and information on, fishing methods, navigation and safety, fishing gear design and construction, gas and diesel maintenance, vessel repairs and maintenance, coastal zone planning and management and exports. They also need training in fish handling, value addition and marketing. Mostly the fishers are dependent on credit to run their fish business. This may be because of the uncertainty of fish catch, high cost of fishing, and lack of trading activities and infrastructural facilities

Gawde, et al, 2006, has reported that large fish farmers engaged in aquaculture may need training on, site selection, pond construction, testing of water parameters, proper bottom slope for drainage of water, formation of bloom in colour range of brownish to yellowish before stocking, PCR testing of seed for presence of WSSV, checking healthiness of seed before packing for transportation, acclimatization of seed, frequent checking of water parameter, use of feed probiotics, use of check trays and adjustment of feed accordingly, maintenance of bloom for initial two months, etc.

The farmer field school (FFS) approach is a participatory, group-based method of adult education that teaches farmers how to experiment and solve problems independently. FFS groups meet periodically, often in the field during a cropping season, to learn by doing. They work with a certified facilitator, who usually has undergone an intensive season-long residential training. Field activities include comparing the performance of experimental plots and conducting field studies to solve local problems.

Though FFS usually target improving the performance of a particular enterprise, this is done in the context of agro-ecosystem analysis – a holistic analysis of an agricultural environment that considers aspects from ecology, agronomy, sociology and economics. The approach has also proven useful for promoting empowerment, building social capital and addressing the problems women farmers face such as illiteracy or difficulties in attending extension meetings far from home (Dhamankar and Wongtschowsk 2014; Davis et. al. 2012; Friis-Hansen et. al. 2012).

Manish Mahant, Abhishek Shukla, Sunil Dixit, Dileshwer Patel, (2012) revealed that the application of Information and Communication Technology (ICT) in agriculture is increasingly important. E-Agriculture involves the conceptualization, design, development, evaluation and application of innovative ways to use information and communication technologies (ICT) in rural domain, with a primary focus on agriculture.

Information and Communication Technology (ICT) can play a significant role in maintaining properties of information as it consists of three main technologies. These technologies are applied for processing, exchanging and managing data, information and knowledge.

Methodology

3.1 Locale of the study

The Indian State of Karnataka is located 11°30' North and 18°30' North latitudes and 74° East and 78°30' East longitude. It is situated on a tableland where the Western and Eastern Ghats range converge into the complex, in the western part of the Deccan Peninsular region of India.

The State is bounded by Maharashtra and Goa States in the north and northwest; by the Arabian Sea in the west; by Kerala and Tamil Nadu States in the south and by the States of Andhra Pradesh and Telangana in the east. Karnataka extends to about 750 km from north to south and about 400 km from east to west. Agriculture is the primary occupation of most of Karnataka's rural residents.

A total of 1, 23,100 km^2 of land is cultivated in Karnataka, constituting 64.60% of the total geographical area of the state. According to the 2001 census, farmers and agricultural laborers formed 56% of the workforce of Karnataka. Agriculture in Karnataka is heavily dependent on the southwest monsoon since the extent of arid land in the state is second following Rajasthan.

Only 26.5% of sown area (30,900 km^2) is subjected to irrigation. The state has three agricultural seasons – Kharif (April to September), Rabi (October to December) and Summer (January to March). (https://en.wikipedia.org/wiki/Economy_of_Karnataka).

3.2 Selection of area

The present study is taken up in the two districts of South Karnataka namely Chikkmagaluru and Shivamogga, because from pre-existing literature it is found that Chikkmagaluru district is having tremendous production and productivity of Coffee as a major crop (https://www.indiacoffee.org/coffee-statistics.html) followed by black pepper, cardamom, cocoa and other horticultural crops moreover the Coffee Board of India at Baalehonuuru , office of Dy. Director Coffee Board (Extension) at headquarter, KVK, AHTIC, ZAHRS and College of Horticulture Mudigere, whereas Shivamogga district with high production productivity of paddy, arecanut, maize majorly and district having SAU i.e., University of Agricultural and Horticultural Sciences, KVK Shivamogga, NGOs (CRDS, Janaspandana, SKDRDP) are working in both the districts very well in the field of agriculture and allied sector so the villages of Bhadravathi, Shivamogga taluks and Chikkmagaluru, Mudigere taluks of Shivamogga and Chikkamagaluru district respectively were visited for the data collection.

Fig. 2: Researcher interaction with farmers and coffee board liaison officer for the primary and secondary data respectively

3.3 Selection of the Respondents

Different stakeholder organization responsible to disseminate the services of agricultural extension such as VOs, FPOs, KVKs, NGOs, advisory consultancy, agriculture department, horticulture department etc. and stakeholders i.e., farmers from different villages of selected districts will form the sample size of the present study.

3.4 Research Design

In the present study, ex post-facto research design will be employed, because the phenomenon had already occurred and the researcher does not have any control over independent variables. For the purpose of present study both qualitative and quantitative data will be collected in the geographical area of the target population.

3.5 Data Collection Tools and Techniques

A semi-structured interview schedule has been prepared to analyze the impact/effectiveness and choice of preference as well as attitude of the farmers regarding advisory services and to know the role of extension services for improving and betterment of livelihood of farm families. Focus group discussions and observation methods will be done to collect the information.

Data collection

Data was collected in three phases:

First phase: Secondary data is collected after reviewing the annual reports, research papers, proceedings and online published reports, books, magazines etc., which will help to explore different case studies of regarding good agricultural extension practices and organizational linkage for extension services in the selected districts of Karnataka to achieve the objectives of the study.

Second phase: Extension agents from different sectors (Public, Co-operative, NGO and Private) were interviewed in groups or/and individually in the selected study areas with the help of semi-structured interview schedule. ATIC, Agriculture and allied departments, NGOs, SAU (UAHS) is visited for the secondary data. The data regarding coffee farming, director, liaison officer of Coffee Board where the project is ongoing were interviewed to collect the information. For the data regarding areca nut farming cooperatives like MAMCOs, TUMCOs, CAMCOs and KVK of Shivamogga are visited.

Third Phase: Farmers were interviewed in groups/ individually, using semi-structured schedule to find out the impact of good practices in agricultural extension on farmers which improve farm production and decision taking ability. Focus group discussion (FGD) and observation method were also used to support collected data.

Evaluation hierarchy	Measurements	Indictors
Level 7 (End results)	**Extension practices usefulness further changes required**	Change in crop production, Change in social status, Change in Annual income, Change in expenditure pattern and saving pattern
Level 6 (Practice change)	**Technical advices adoption**	Non-adoption, partial adoption and full adoption of technical advices
Level 5 (KASA change)	**Farmers' perceptions**	Changes in Knowledge, Attitude, Skills, Adoption etc. of good extension practices
Level 4 (Reactions)	**Farmers' feedback**	• Factors of motivation to adopt different extension methods • Reasons to change/ adopt different extension methods in the past two years

Level 3 (Participation)	**Activities completed**	Involvement of farmers in different extension service providers
Level 2 (Activities)	**Activities performed by farmers in his farm**	• Crop production, productivity, • Livestock production, productivity • Crop protection • Intercultural operations • Post-harvest management • Marketing of produce
Level 1 (Inputs)	**Investments and resources used**	• Time required for attaining extension methods like Demonstration, phone calls, trainings, group discussion etc. • Time utilized for video call, for watching different agriculture related videos, for using agri. mobile apps. • Investment cost in subsidiary business and new farm inputs Labour required for agricultural activities in farm.

In present study both primary and secondary data will be used. Secondary data will help to explore impact of various agro-advisory services, different approaches and role of extension services in the selected districts of Karnataka to achieve objectives of the study. The primary data will be collected by conducting personal interviews by the respondents. Focus group discussions and observation method will also help to collect the data for present study.

Results and Discussion

Agricultural extension services and programs are mainly aiming to strengthen the farmer's capacity to innovate, by providing access to knowledge and information.

It provides efficient and effective need-based extension services to all categories of farmers, to enable them to optimize their use of resources, in order to promote sustainable agricultural and socioeconomic development, so that they adapt some techniques of improving production and informed decisions. It was found that various good practices in agricultural extension in the study area depicted in Table 1.

Table 2. Good Practices in Agricultural Extension at Chikkmagaluru and Shivamogga region

Sl. No.	Extension Approach	Objective / Details	Advantages	Drawbacks
1.	AHTIC Agricultural and Horticultural Technology Information Centre	To provide 'one stop shops advisory center for farmers'	• Multiple aspects of farm advisory made available at one center • Availability of farm publications and input	Time barrier
2.	Coffee Krishi Taranga	Toll free IVRS service by Coffee Board for the advisory on Coffee farming	At any moment a farmer can call and get advised on free of cost on toll free number 080-376 85000	Network problem in the hilly areas like Chikkmagaluru coffee growing areas
3.	CHSC-Custom Hiring Service Centers	• Mainly to avoid the major problem of labors availability • To promote mechanization	Farm machineries are made available on rental basis at affordable fares	Less number of CHS centers leading to lag in reaching all farmers
4.	Night Meetings (Film Shows)	Using Pico projectors (Hand projectors) films are shown in order to educate farmers	Usage Audio-Visual aids ensures better transfer of knowledge	Limited number of projectors and problem with content development by extension agent

5.	Extension through Social networking (Facebook & What's app)	Department of Agriculture and allied line departments transferring farm techniques through text, picture and videos	Majority of farmers are able to discuss their queries in comment section	No proper content development leading to confused transfer of information
6.	Training on processing and value addition	Farmer Producer Companies are able to organize and provide potential trainings by linkage with various organizations	Farmers are trained on value addition in agriculture which ensures income generating activities	One must be member of Farmer Producer Organization in order to avail facilities
7.	Farm Consultancy Center (Horti Clinic)	Horticulture Department able to set up farm consultancy service with Subject Matter Specialist as Consultant	What's app groups are made for farmers to discuss their queries and field visit and consultancy made available	Not all the farmers are able to access services due to drudgery in owning mobiles

Case studies of Good Practices in Agricultural Extension are enlisted below

Case 1. AHTIC; A Single Window Farm Advisory System

Service Provider - Agricultural and Horticulture Technology Information Centre (AHTIC)
Head - ADR (ZAHRS) Mudigere
Location - Mudigere, Chikkmagaluru
Methods of approach - One Stop Technical Information Centre (single window delivery system)
Extension Methods used - Farm Literature, CD ROM, Agri inputs (Seedlings, bio-fertilizer) Consultancy and Analytical Services

Background of the case

Agricultural Technology Information Centre (ATIC) was initiated during 2015 at ZAHRS Mudigere, and University of Agricultural and Horticultural Sciences Shivamogga which has a separate sale counter wherein, the technology inputs of the University are made available to the visitors. ATIC started under the National Agricultural Technology Project (NATP) Phase II with the following objectives:

- To provide a 'single window' delivery system for the products available from KVK Mudigere to the farmers and other interested groups as a process of Innovation in Technology Dissemination at the Institute level.
- To facilitate direct access to the farmers to the institutional resources available in terms of technology, advice, technology products etc., for reducing the time lag in technology adoption.
- To support system linking the various units of a research institution with intermediary users and end users (farmers) in decision making and problem-solving exercise.
- To provide a mechanism for feedback from the users to the Institute.

Services Provided by AHTIC

- Diagnostic services for soil and water testing, plant and livestock health
- Supply research products such as seeds and other planting materials, poultry strains, livestock breeds, fish seed, processed products and other farm products that are developed/produced in the Institute.
- Sale of publications (folder on Black pepper as intercrop in rubber, four decades of cardamom, 2018) and farm manual like package of practice materials as well as audio-visual aids produced by the research organization.
- Quality planting materials, various technological inputs and products and priced publications including CD ROMs on various aspects of paddy, coffee, areca nut and cocoa cultivation are sold to farmers and other stakeholders through ATIC

The details are furnished as follows

- Price List
- Consultancy Services
- Analytical Services

Farm Advisory Services

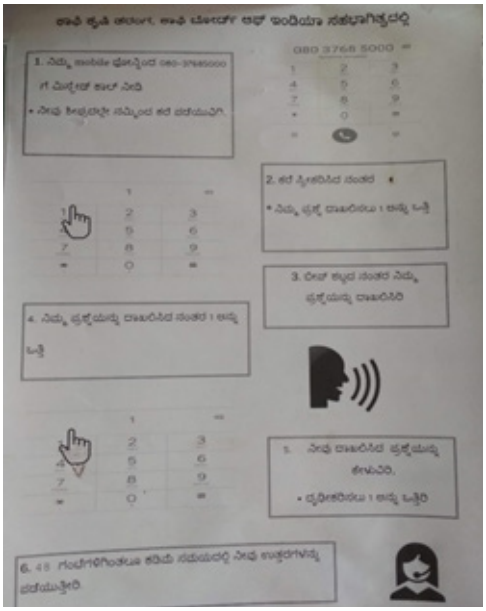
Farmers can avail Farm Advisory Services from ATIC through the following methods:

- Personal visit to ATIC
- Through Postal correspondence
- Telephone-Helpline services
- Reply through email

Active Regions - Mudigere, Chikkamagaluru, Shivamogga districts
Stakeholder category - CoH, KVK, ZAHRS (Public sector)
Address and Website - Dr. M. Shivaprasad, ADR
Agricultural and Horticultural Technology Information Centre
ZAHRS, Mudigere taluk, Chikkmagalauru district, Karnataka State
+91-9480838966
http://uahs.edu.in/extention/

Case 2. Coffee Krishi Taranga- an IVRS for Advocacy on Coffee Farming

Service Provider - Coffee Board of India
Methods of extensions used - Estate/Field visit and advisory, Diagnostic survey, Mobile based extension (IVRS), planter's information exchange meets (farmer led extension), weather based informational SMS services
Headquarters - Baalehonnuru, Chikkamagaluru
Area of operation - Coffee growing regions in the state of Karnataka



The Coffee Board of India is an autonomous body, functioning under the Ministry of Commerce and Industry, Government of India. The Board serves as a friend, philosopher and guide to the coffee industry in India. It is set up under an act of the parliament of India in the year 1942, the Board focuses on research, development, extension, quality up gradation, market information, and the domestic and external promotion of Coffees of India.

The Board conducts basic and applied research on coffee and can boast of 75 glorious years in coffee research. The Central Coffee Research Institute in the Chikkmagalur District, Karnataka State has been in the

forefront of coffee research over the years and continues to remain one of the premier institutes of the world as far as coffee research is concerned. The Research department publishes various journals and periodicals. It also offers various services to growers and exporters.

The Board also has a vast extension network spread over the three main producing states of Karnataka, Kerala and Tamil Nadu, as well as in the non-traditional areas of Andhra Pradesh, Orissa and the seven North-Eastern states. The extension set up provides the day- to- day link with the grower community and this wing facilitates the transfer of technology from lab to land.

Office of Deputy Director Coffee Board (Extension) is looking after the extension activities of coffee board carried by lesion officers in local region for farm advocacy and technical guidance regarding coffee farming.

Chikkmagaluru is the district that lies in the malenadu region of Karnataka State which receives heavy rainfall about 1506.3 mm in the SW monsoon and located in Southern Plateau and Hills Region (Agro-Climatic Region-Planning Commission) where it is very difficult to do field visits to the extension agents hence the Coffee Board launched an Integrated Voice Response System at head office, Bangalore, Karnataka in order to solve the queries of coffee growing farmer by giving missed call to IVRS number '080-37685000' which is 24*7 toll free services where farmer can get their problem solved within 48 hours of calling. If the case is critical, they convey the issues to the liaison officers/ extension officer who will be taking up issue and provides appropriate information to the needy farmers.

As this is 24*7 toll free services has helped large number of farmers in solving their queries without waiting for extension agent. The major queries were regarding coffee stem borer, leaf rust and berry borers, farmers used to get immediate response for their queries on coffee aspects.

Case 3. Yantradhara – Custom Hire Service Centers

Service Provider	-	Sri Kshetra Dharmasthala Rural Development Project (NGO) collaboration with Govt. of Karnataka
Headquarters	-	Ujire, Dakshina Karanataka
Method of Extension used	-	Custom Hiring Services, Capacity Building though SHGs, FIGs, Farm Tours, Farm Magazine (Niranatara)
CHS Centres	-	164 hoblis covering 25 districts of Karnataka and Parts of Kerala

Background of SKDRDP's Yantradhara CHSC

SKDRDP and Department of Agriculture, Govt. of SKDRDP and Department of Agriculture, Govt. of Karnataka joined hands together to establish Yantradhara - Custom Hire Service Centers at Hobli level, with an objective to assist small and marginal Farmers in order to reduce the drudgery of timely availability of farm labours and to promote farm mechanization by providing farm equipment's/ machineries at their door step.

Objective of the CHCS

- To provide machineries at farm gate.
- To enhance the production and productivity of the crops
- To provide services of high-tech machineries to small and marginal farmers in time
- To mitigate problem of labour
- To make farm machineries available at reasonable rentals
- To increase profitability of the farmers

The special features of Yantradhara are:

- Availability of modern equipment's
- Experienced drivers and operators for the equipment's
- Availability of timely service
- Advance booking facility

Description of the practice

Indian agriculture is undergoing a gradual shift from dependence on human power and animal power to mechanical power because increasing cost for upkeep of animal and growing scarcity of human labour. Further, use of mechanical power has a direct bearing on the productivity of crops apart from reducing the drudgery and facilitating timeliness of agricultural operations.

Thus, there is a strong need for taking farm mechanization. So, Agriculture Department the Government of Karnataka has decided to establish Custom Hire Service Centre (CHSC) at hobli-level, with an objective to assist the small and marginal farmers to provide machineries at their door steps. In this direction, as per the orders of the Department of Agriculture Government of Karnataka and SKDRDP(R) jointly has taken steps to establish CHSCs in selected 164 hoblis covering 25 districts.

List of Machineries available at SKDRDP'S CHSC are:

1. Plough

The plough is a farm tool or implement used in farming for initial cultivation of soil in preparation for sowing seed or planting. It consists of a heavy blade at the end of a beam, usually hitched to a draft team or motor vehicle and used for breaking up soil and cutting furrows in preparation for sowing. For centuries, this basic instrument has been widely used for farming and soil preparation.

2. Tiller

Tillers are basically used for stirring and pulverizing the soil for planting, or for weed control or moisture conservation. They came in variety of shapes and sizes. Farmers are advised to test their soil condition, nature of crop and other factors before sourcing tillers for their specific requirement.

3. Harvesting Machinery

The mechanization of agriculture not only reduces the overall cost of production but also increases the total agricultural yield. Through mechanized farming, many countries in the world are reaching the upper limits of their cultivable land. The increasing use of agricultural machinery, equipments and fertilizers coupled with better irrigation facilities, together revolutionizes the agricultural sector.

4. Sprayers

Insects and weeds are largely responsible for the crop destruction. In modern horticulture and agriculture, insecticides/pesticides, a man made or natural preparation are used to kill insects or otherwise control their reproduction. These herbicides, pesticides, and fertilizers are applied to agricultural crops with the help of a special device known as a "Sprayer." Based on the concept of high pressure, sprayer provides optimum performance with minimum efforts.

5. Other machineries like Arecanut De-husker, Aluminium Ladder, Levelling Blade, Sowing & Planters, Manual Battery Sprayer, Arecanut Sprayer, Arecanut harvest machine, Knack sack Sprayer, Paddy Thresher, Battery Sprayer, Paddy trans planter, Cage wheel, Petrol Engine Sprayer, Chain Saw, Power Cone Veeder, Power tiller M B plough, combine Harvester Finger, Kunti, Rain gun, Seed cum fertilizer, Single plough, Jet, bend and Kubota cultivators.

Beneficiaries talk

The sound of the paddy planting machine was loud in the paddy fields of the Shivamogga paddy belt during the early morning hours. With the lack of skilled labours and machineries for Paddy and Areca nut cultivation, many were thinking of shifting from paddy farming to other, were happy when they realized that there was an advantage in mechanics. Mr. Malleshappa, paddy cultivator of Ayanuru village of Shivamogga taluk owns three acres of land. Traditionally Paddy Growers who have been growing paddy since the last few years, have brought a paddy planting machine on hire basis from the Custom Hiring Service Centres of Sri Kshetra Dharmasthala Rural Development Project

Paddy had been planted by machine. Resulting after the mechanized transplantation from the Rural Development Program has yielded good results than the row planting model. Inspired by Sri Paddy's paddy cultivation, he was on a two-acre farm in Shivamogga Taluk. Made of nursery of paddy sapling and used for planting. The problem of skilled labour and suitable machinery haunted him. There are many instances where farmland is scarce due to shortage of farm laborers and it has become a nut garden. Farmer labours from Kumsi, Henegerekatte and Ayanuru are getting Rs 250 per day. Meals and vehicle rentals to bring and dropping them used to cross Rs. 300, so paddy farming did not benefit them. Once after realizing the availability of agricultural machineries from CHSC of SKDRDP. Then the yield of paddy is as high as 13-15 quintal yields per acre. The grass is getting better so paddy farming is profitable for us.

Active Regions - 164 hoblis covering 25 districts of Karnataka and Parts of Kerala
Funding - 50:50: Govt of Karnataka: SKDRDP
Website - http://skdrdpindia.org/programmes/agriculture/chsc/

Case 4. Pico Projectors- A Video based extension for better understanding of plant protection

Service Provider - ATMA, Dept. of Agriculture
Method of Extension used - Video based Extension, Night meetings, FFS, Training, Field Day, Awareness Programme
Location - Bhadravathi Taluk, Shivamogga District
Area of Interventions - Plant Protections measures, Pest and disease identification, water and soil management practices

In Shivamogga district, farmers majorly grow maize crop next to paddy and areca nut. The major problem in the maize crop in this region is infestation of fall army worm (Sainika hulu) which is a serious pest and complex problem for farmers. The control measures were partly known by farmers hence to create awareness regarding pest and disease management Block Technology Manager of ATMA were started video-based extension in order to disseminate the information identification of insect pest, symptoms of incidence, remedial measure to control disease etc are taught to farmers with well-prepared video of full information about control of infestation, which is projected by small hand device called 'Pico Projector' on white background in the dark room by arranging night meetings during the either pest outbreak time or on need based time period. By this type of practice in extension, farmer can able to get knowledge on symptoms

of infection/disease and also regarding control measure and life cycle of pest. This practice started with the motive of pictorial-video based information which penetrates into the minds of farmer rather than simple literature, therefore this model is popularly in practice for disseminating other information like clean hand milking, soil borne disease in zinger, dairy management aspects, effects of pesticide on human health etc., were projected and created awareness and successful in transfer of knowledge by ATMA at Bhadravathi, Shivamogga.

Contact person/ Mr. Rakesh, BTM,
Service Provider ATMA, Bhadravathi RSK, Shivamogga Dist.
State Dept. of Agriculture, Karnataka, 882266904
(https://www.facebook.com/bdvtrakesh)

Case 5. A Neera tapping: Training by Malnad Spice and Nuts Producer Company

Service Provider - Malenad Nuts and Producer Company, Baaranduru, Bhadrvatthi Shivamogga
Method of Extension used - Off campus Training, Custom Hiring Services, Technical advisory, Farm Calendar
Headquarters - Barandooru, Bhadrvathi, Shivamogga
Area of Interventions - Agriculture and allied activities and processing sector

Background of Malnad Spice Producer Company (MNS)

Malnadu Nuts and Spices Producer Company 100 % owned by farmers of Shivamogga and Chikkamagalur districts of Karnataka, popularly known as MNS -FPC. Farmer Producer Company is a hybrid between cooperative society and company. MNS is the 1st FPC to get Neera license from Government of Karnataka to tap and process Neera. Neera is tapped from the inflorescence of the coconut tree and stored below 4 °C to prevent enzyme activity which leads to fermentation and loss of nutrients.

Neera is rich in minerals and vitamins and it contains glucamic acid necessary for proteins synthesis. It aids in digestive health. Neera contains vitamins (Vit. A and Vit. C), which have antioxidant properties thereby preventing damage or death of cells.

Neera Sugar: It is granulated form of sugar prepared from Neera concentrate; it has a low Glycaemic Index and low Glycaemic Load. It is particularly beneficial for diabetes.

Value addition to tender coconut

Tender coconut consumption accounts for a meagre ten percent of the total coconut production. Despite being nature's purest drink, tender coconut does not enjoy its share of market owing to stiff competition from the chilled synthetic beverage industry.

The primary hurdle in the chilling and marketing of tender coconuts is its bulky nature. In the present study, minimal processing of tender coconuts is done by trimming off the husk to the maximum possible level, without exposing the shell. This resulted in considerable reduction in weight and volume of the nut. After processing in citric acid, packaging and cold storage these coconuts are superior in terms of physical, biochemical, microbial and sensory quality of tender coconut water compared to other treatments. By adopting minimal processing technique, we are marketing tender coconuts as a chilled beverage.

Services of MNS-FPC

1. Training for processing and climbing

MNS FPC has been training the rural youth / farmers subjected to the selection of coconut plant and inflorescence, neera tapping, safe climbing of tree.

2. Areca nut trading, storing and credit facility

MNS has storage, credit facility and marketing facility for all variety of areca nut. MNS is also in the process of developing integrated areca nut processing machine.

3. Agriculture Equipment Rental Service

MNS is undertaking Agriculture equipment rental service under the Yanthra Dhara scheme of Government of Karnataka and providing agri equipments and subsidized rates to its member farmers.

4. Intensive Agriculture Advice Service

MNS is promoting intensive and multi crop culture among its member farmers. As part of this initiative MNS has already distributed black pepper saplings to among its members to cultivate it in their areca nut farm. MNS conducts awareness programs on different, alternative and new crops that can co-exist with the existing areca nut and coconut trees, like bamboo, pepper and forest farming.

5. Soil Testing Lab

We undertake analysis of a soil sample to determine nutrient content (NPK and micro nutrients, composition, and other characteristics such as the acidity or pH level.

Fig. 5. Farm Calendar with bulletin information on crops like Arecanut, Coconuts, Black Pepper etc

Beneficiaries talk on services given by MNS-FPC

Achyutha son of Hanumatappa is a young farmer from Baranduru village of Bhadravathi taluk, Shivamogga district. He possesses 2 acres of agricultural land in which he is cultivating paddy in 1.5 acres and in the remaining half acre, he has 20 coconut palms. He is maintaining two dairy animals and getting an income of Rs. 50, 000 per annum by selling milk. Before the establishment of *Malenadu nuts and spice producers' company private limited* in 2016, he was serving as tractor driver along with farming.

Once after producer company introduced with the *neera processing technology*, off campus training has been given to coconut farmers on acquiring skill of tapping neera by climbing coconut palm with help of climbing friendly equipment at CPCRI Kasaragod, Kerala, then after getting trained he shifted from traditional method of selling coconut products like copra and tender coconut to selling of neera, a by-product of coconut with the help of climbing device given by producer company.

In traditional method for selling coconut he had problem of fluctuations in the market price and also had burden of transportation cost. But once after he started selling neera to the producer company he is able to earn Rs. 1000 Out of 40 litres of neera from 20 palms per day. This accounts Rs. 30,000 per month. Earlier he was able to earn only Rs. 8000 per month out of rental driving of tractor now is engaged with earning almost every day. The training on neera extraction skill trained by the *malenadu nuts and spice producer company* transformed him as an economically stable coconut farmer.

Outreach - Bhadravathi and Theerthahalli taluk of Shivamogga and Parts of Chikkamagaluru

Head of FPC - MANOHAR MASKI
Chairman, MNSPC Ltd.
Director- Founder

Funding - Stakeholders share under Producer Company

Address - MALENADU NUTS AND SPICES PRODUCER COMPANYPMITED
BARANDURU, N.H 206, B.H. Road,
Bhadravati Taluk, Shivamogga District.
PIN-577 245
Phone: - 08282 240007
WhatsApp: 91085 13555

Website http://www.malenadunuts.com/services.html

Case 6. Social Media as channel for farm communication; Horti Clinic- An advisory centre

Service Provider - Department of Horticulture

Headquarters - Shivamogga

Method of Extension used - Farmers field visit, Technical solutions to farmers filed problems, Social media for extension Whats app mass communications, (Facebook page: Totagarike ilakhe), Radio talks, Publication and farm literatures

Outreach / Area of operations - Shivamogga district

Background of Horti- Clinic Information and Consultancy Centre

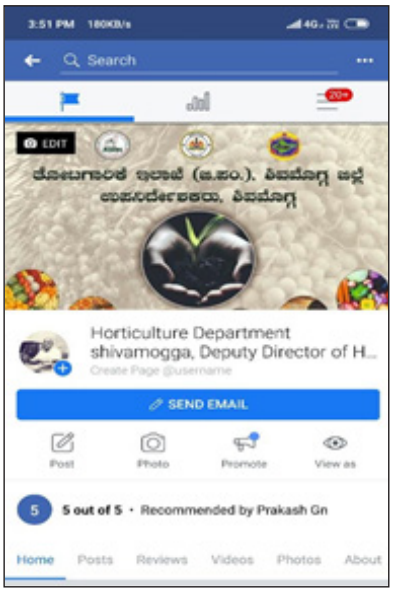
Horti- Clinic Information and Consultancy Centre is started in the year 2010 with the support of State Department of Horticulture with the objective of providing need based technical assistance at door step of farmer through many extension methods i.e., Field diagnostic visits with concerned agriculture scientist, Information like calendar of farm operations, radio talk on various aspects of farming, soil and water testing facilities, crop seminars.

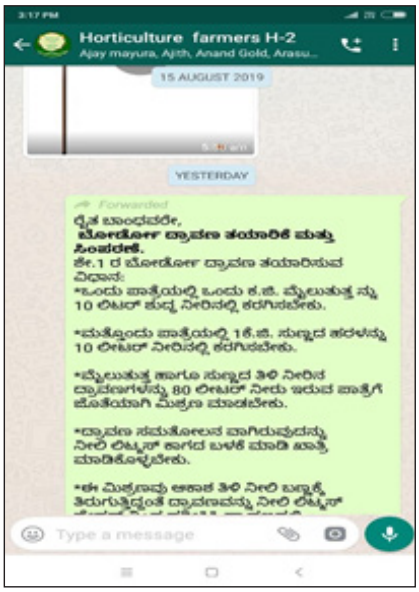
Since now a day's social media is often used by majority of current generation young farmers are also made facilitated with online platform (Facebook, what's app group messaging) to discuss or post their queries on farm production, post-harvest, market information, weather information as well as real time information on water level of dam etc.

Objective of the Horti-Clinic

- To provide need based technical advisory on door step of farmers
- To avoid the communication gap between extension agent and farmers
- To enhance access to the farmers to the institutional extension activity
- To reduce the risk of misguidance in the information

How it works





The State Department of Horticulture, Shivamogga, Govt of Karnataka has made separate wing for extension and farm advisory named as 'Horti-clinic- Information and Consultancy Centre' in order to make farmers to come forward to get served on their farm related problems and also, to enhance the accessibility of institutional extension services.

A Subject matter specialist in the field of Horticulture was appointed in order to look after the consultancy services and need based technical assistances. Farmers are allowed to seek their queries and technical assistance on horticulture crops and can also approach consultancy centre with their disease / pest specimen, water, soil sample in order to solve their issue.

The extension agents are communicating large number of farmers through their mobile number database in order to disseminate real time information on farming. As now a day's social media has been quite common tool for mass communication hence this ' Horti clinic' had tackled this Facebook (Totagarike ilakhe) and what's app group messaging (groups per hobli) platform to use as channel to reach farm information and technical assistance which includes information on input (seeds, cuttings, variety) availability, weather and market information, production and post-production management, crop protection aspects from authorized sources like department and SAUs package of practice and publications were disseminated to the farmers.

They also giving radio talks on various aspects of locally growing horticultural crops like koleroga in Areca nut, quick wilt in Black pepper, rhizome rot in zinger, panama wilt in Banana etc., also by giving diagnostic field visit on the call from farmer.

Active Regions - All taluks of Shivamogga district, Karnataka
Funding - Dept of Horticulture, Govt. of Karnataka
Website - https://www.facebook.com/horticulture.depatment.5

Table 3. Agro-Climatic Chracterstics of Shivamogga and Chikkmagaluru

Sl. No.	Taluk	Major crops & enterprises	Major problem identified	Identified Thrust Areas
1.	Chikkamagaluru	Paddy, Coffee, Black pepper, Arecanut, Ginger, Banana, Maize, Kitchen garden, Cattle, Poultry, Piggery, Ground nut, Coconut Tomato, Vegetables, Onion, Potato	• Decline in paddy yields due to pest, disease and weed incidence • Non availability of varieties • Shortage of Labour • Non awareness about soil reclamation procedures, nutrient management, severe nutrient loss and poor nutrient use efficiency • Coffee stem borer and leaf rust management • Bunchy top and sigatoka leaf spot incidence in banana • Low yield of pepper due to poor fruit set and severe shedding of berries • Nutrient management practices in pepper and coffee • Severe wilt/foot rot incidence and poor processing and value addition • Nutrient deficiency in groundnut • Pest & disease in vegetables • Nutrient deficiency in maize • Water management • IPDM in coconut • Alternative crops in protected cultivation	• Acid soil management • Integrated nutrient management • Integrated pest & disease management • Mechanization • Introduction of high yielding variety • Livestock management • Integrated nutrient management • Integrated pest & disease management • Mechanization • Introduction of high yielding variety • Livestock management
2.	Shivamogga	Arecanut, Banana, Maize, Red gram, vegetable crops; Ridge gourd, Loose flowers, Fodder crops, Fisheries, Poultry, Dairy farming	• Lack of Knowledge on high yielding and disease resistant hybrids or varieties in vegetable and field crops • Nutrient deficiency, Nut splitting, inflorescence die-back, inflorescence caterpillar and Hidimundige in Arecanut • Infestation of Stem borer and Army worm in Maize • Less awareness of value addition in Maize • Slow degradation of areca husk, farmers are throwing and burning in public places.	• Varietal introduction • Integrated nutrient management • Integrated Pest and Disease Management • Value addition • Resource conservation • Feed and fodder technology • Feed enrichment

		• Less awareness on areca husk composting method (1.25 t/ha Areca husk compost available) and unaware of Nutrients composition in areca husk compost • Non availability of required quantity and quality of FYM • High cost for FYM • Pseudo stem Weevil, Sigatoka Leafspot and Panama Wilt in banana • Lack of new flower crops for garland makingLack of awareness on new varieties which affects the growth and productivity in composite fish culture • Low milk production and quality problems in dairy farming due to imbalanced energy and protein Lack of awareness on new varieties in fisheries affects the growth and productivity

Source: KVK Annual Report, 2018-19, Chikkmagaluru and Shivamogga

Table 4. Area, Production and Productivity of major crops cultivated in the study districts

Sl. No.	Crop	Area (ha)		Shivamogga		Productivity (kg /ha)	
		Chikkmagaluru	Shivamogga	Chikkmagaluru	Shivamogga	Chikkmgaluru	Shivamogga
1	Paddy	33723	120629	4500	394521	151754	3332
2	Maize	26140	47254	2150	191117	56201	3074
3	Arecanut	43459	50820	53649	72726	1230	1300
4	Coffee	88645 (Arabica -56995 Robusta -31650)	-------	76855	-------	867	------
5	Black pepper	8334	1354	2678	450.54	320	330
6	Cardamom	2875	-------	48336	--------	170	-------
7	Banana	5232	5204	130472.99	138125	24930	2654
8	Onion	7268	-------	117727.00	-------	16200	-------
9	Potato	4221	-------	56221.84	-------	13320	-------
10	Ginger	-------	5892	-------	58920	-------	1000

11	Tomato	2833	116	62676.50	2650	22120	22.84
12	Chilly	3023	138	4034.50	1992	1330	14.43
13	Cattle	257740	521246	-------	65.7 million ltr	-------	7.2 ltr
14	Sheep	91155	42772	-------	4.61 lakh kg	-------	18-19 kg
15	Poultry	1178382	1738774	-------	116 million eggs	-------	290 eggs / year

Source: Director of Economic and statistics, Department of Horticulture, Shivamogga, Department of Agriculture, Chikkamagaluru and Chikkamagaluru dist. Statistical report

The available improved agriculture technology has the potential of raising the yields of agriculture products in the country in a profitable way. This can only be done, under the existing set of conditions, if the technology is communicated to the farmers in proper way such that they should also be convinced of its economical adoption in their local conditions.

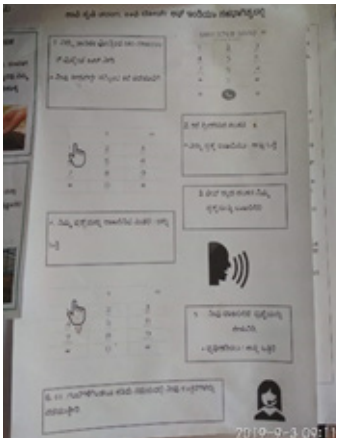
In order to provide advocacy regarding farming, various approaches have been using to disseminate information is found as shown below in table

Table 5. Major extension service providers and their approaches

Sl. No.	Institute/ Organiz-ation	Sector	Method of approach	Interventions/ thematic area
1.	KVK	Public	• Training • FLD • Group discussion • Advisory services • Technology week • Gosthies • Crop Lectures • Exhibition • Film show • Fair • Farm Visit/Farm Tour • Diagnostic Practical • Crop Seminar • Radio Talk	• Crop Production • Soil Health and Fertility Management • Livestock Production and Management • Home Science/Women empowerment • Agril. Engineering • Plant Protection • Fisheries production technology • Production of Inputs at site • Capacity Building and Group Dynamics • Agro-forestry • Soil & water testing & Soil sampling, • fisheries, value addition, Apiculture • Soil analysis, mushroom cultivation • Animal health camp • Protected cultivation, Bee keeping

			• Field Visit • Mobile Advisory • CD ROMS • Vocational Trainings • FFS • OFT and MD	• vermi composting and composting methods • Water management, Dairy management • Poultry farming, Liquid manure preparation
2.	ATIC / AHTIC	Public	• Farm Advisory Services • Farm Publication	• Advocacy on Production and protection management of Horticulture crops, Field crops etc. • Sale of Farm Publication, Sale of Input like Seeds, Products and Package of Practice
3.	ATMA	Public	• Video based extension • Night group meetings • (Pico projectors) • Social Media Extension • (Facebook, YouTube)	• Pico projectors" (Hand Projectors) are used to show the films to educate on crop protection and water conservation management aspect • Example, Fall Armyworm management (Identification of larvae, spraying of chemical and its management) during Pest outbreak in Maize  • Text, pictorial and video-based information on agriculture is disseminated.
4.	Dept of Agriculture	Public	• Demonstration • Field day • ICT-Extension by Mobile • Diagnostic Visits • Technology Week • Off and on campus training • LED notice board • Jingles in PAS	• Group meetings are conducted on various crop management aspects of major crops of the district • Method demonstrations are conducted • Information Exchange Programme is conducted in collaboration of various allied departments and progressive farmers of the area • DATC conducting training to farmer on various aspects

			• What's group messaging 	• DATC conducting training to farmer on various aspects
5.	SAU/ CoH	Public	• Krishi mela, • Exhibition • Technology Week	Mass awareness on modern technology in Agriculture
6.	Dept. of Horti-culture	Pubic	• Mobile Advisory-Whats app • SMS advisory • Trainings • Mobile App • Field Visit • Social Media (Facebook, Whats app) • Radio Talk  https://www.facebook.com/horticulture.depatment.5	• Horti Clinic-Consultancy Centre • Kissan App disseminates Weather information, Market information, Crop production and Protection aspects • Flower Show (Exhibition), On campus Training on Bee keeping, kitchen gardening etc. • Regular dissemination information of Agricultural and allied aspects through whats app groups and Facebook page of Dept of Horticulture

7.	Dept. of Animal Husbandry	Public	• Health Camps • Awareness Day • Trainings • Awareness Posters	• Vaccination of Ruminants for the major disease like FMD, Rinder's pest, Anthrax and Black Quarter • Health camps are conducted during pre-monsoon and peak periods of disease incidents for the ruminants • Awareness programme on precautionary measure and management of sheep, goat, mulching and poultry birds
8.	Dept. of Sericulture	Public	• E extension (Using ICT) • Farm Literatures • Training • (Off Campus) • Information Kiosks	• Real time farm advocacy on sericulture aspects were given through Social (Whats app groups, Facebook) • Trainings on silk rearing (Tassar silk), chandrike management etc., were given on various sericulture training center (Hassan, Ramanagara, Channpatna DATC) • Self-explanatory Information Kiosk is used to provide cultivational knowledge on sericulture
9.	Coffee Board	Public	• IVRS system – Coffee Krishi Taranga • Radio Talk • Farm Literature • Demonstration • Diagnostic Visit • Planters Meets 	• An IVRS based toll free enquiry system is working in order to register and solve the cultivational queries of Coffee grower • Radio talks are given on serious measurements on endangered pests like coffee stem borer, rust • Printed literatures are provided in order to enhance mixed farming like Cardamom, pepper, cocoa with Coffee • Planters meet is conducted jointly with input dealers and private consultants

10.	Amalga -mated Bean Company	Private	• Technical advisory • Crop consultancy • Field Demonstrations	• Paid consultancy is given by the private company called ABC on cultivational aspects and post-harvest techniques of Coffee crop • Demonstrations are conducted monthly or fortnight to educate the coffee growers on various cultivational aspects example: Selection of variety, Pruning, harvesting techniques
11.	SKDRDP	NGO	• Training • Capacity Building • Custom Hiring Services	• Conducting various trainings on cultivational aspects on crops of the region • SHGs, FPOs are promoted in order to enhance collective farming • Custom Hiring Services are promoted in order to uplift the marginal farmers income by promoting farm mechanization
12.	CRDS (FPO)	NGO	• Training • Field visit • Farm tour • Technical Services	• Promotion of collective farming i.e., Farmer Producers Organization in order to provide Technical advisory, CHS, Backward and forward linkage as well as credit assistance
13.	Jana Spandana	NGO	• Capacity Building • Training • Technical Advocacy	• Technical assistance on farming of horticultural and agricultural crops of Chikkmagaluru • Field Visits, Farm tour, off campus trainings are conducted
14.	Registered Societies (MAMCOs, TUMCOs, CAMPCos)		• Farm Calendar • Krishi mela • Kissan Goshti • Diagnostic visit • Trainings on climbing tree	• Technical assistance on Arecanut and Cocoa crops • Diagnostic visits are conducted on the planation crops • News letters are sent on general precaution aspects of plantation crops like koleroga management in Areca etc.

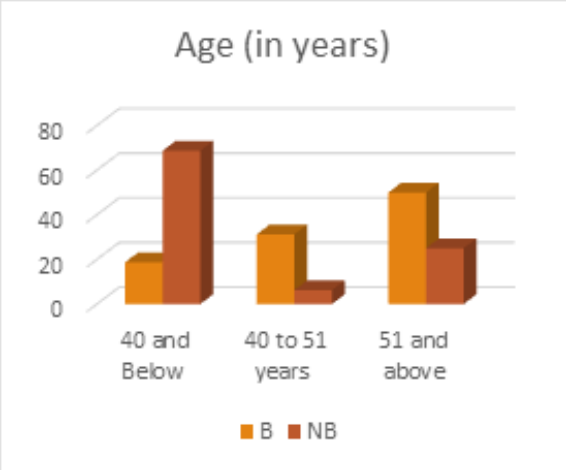
Table 6. KVK's Intervention in the area of Consultancy to the farmers

Sl. No.	Particulars	No. of programmes	No. of participants
	Training Programmes:		
1.	On campus	95	1703
	Off campus	53	1968
2.	On Farm Testings	02	10
3.	Front Line Demonstrations	08	150
4.	Seminar/Workshop	03	238
5.	Special days	09	587
6.	Technology week	05	215
7.	Field day	07	175
8.	Exposure visits	09	289
9.	Farmers Field School	01	30
10.	Farm trials	04	07
11.	Trimonthly	03	97
12.	Scientist Participated as resource person	16	2680
13.	Group Discussion/ Meetings	22	298
14.	Field visits (KVK Scientists visit to Farmers fields)	102	165
15.	Telephone calls (Telephone consultation to farmers)	960	960
16.	Farm Advisory Services including farmers visit to KVK	791	791
17.	Diagnostic visits (KVK staff with other Scientists/Dev. Dept. staff)	10	30
18.	KVK activities coverage in news paper	-	23
19.	Extension literature published (Leaf lets, folders, bulletins, booklets, books, training manual etc.)	-	26
20.	Popular/Feature articles published in News papers	-	10
21.	Popular articles published in Farm Magazines	-	10
22.	Research papers published in scientific journals	-	05
23.	Radio programmes	-	11
24.	Video/CD / Film shows	15	450
25.	Exhibition organized	01	-
26.	Exhibition participated	04	-
27.	Method Demonstrations	105	2625
28.	Farmers-Scientists interaction	08	130
29.	SMS Messages	22	269928
30.	EDP on mushroom	01	30
31.	Awards	06	06
32.	Projects	04	388
33.	Other extension activities:	05	150
	Total	**2271**	**284185**

(**Source:** Annual Report, KVK, Shivamogga)

Table 7. Socio-Economic Characteristics of Respondents of Chikkmagaluru and Shivamogga

Sl. No.	Characteristics	Beneficiary	Non-Beneficiary	Beneficiary	Non-Beneficiary
		f (%)	f (%)	f (%)	f (%)
1.	Age				
	40 and Below	3(18.75)	11(68.75)	9(56.25)	5(31.25)
	40 to 51 years	5(31.25)	1(6.25)	2(12.5)	7(43.75)
	51 and above	8(50)	4(25)	5(31.25)	4(25)



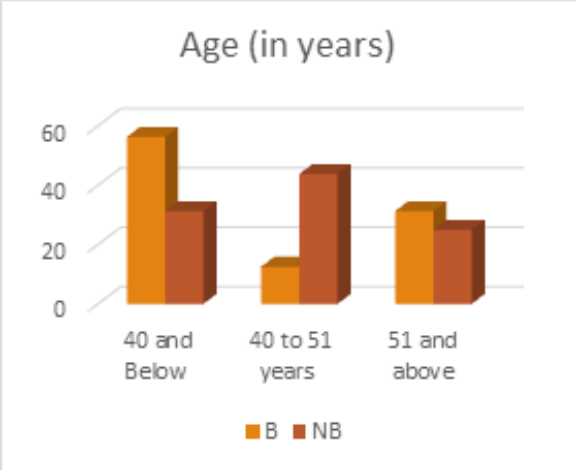


Table 8. Farming Experience of the respondent

1.	Farming Experience	Beneficiary		Non-Beneficiary	
	less than 10 years	1(6.25)	1(6.25)	3(18.75)	1(6.25)
	between 10 to 17 years	6(25)	4(37.5)	6(37.5)	6(37.5)
	more than 10 years	8(68.75)	11(50)	7(43.75)	9(56.25)

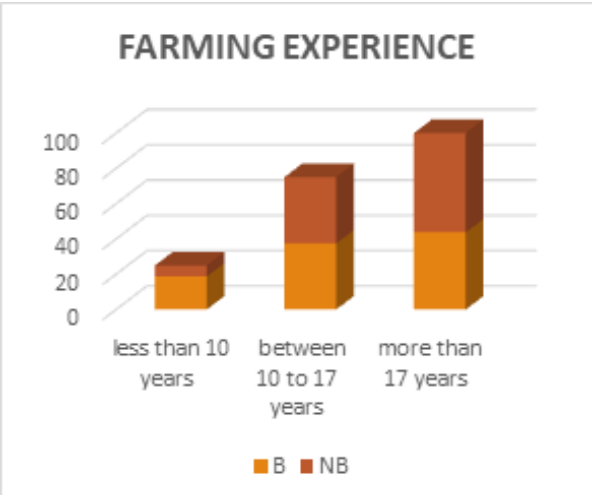
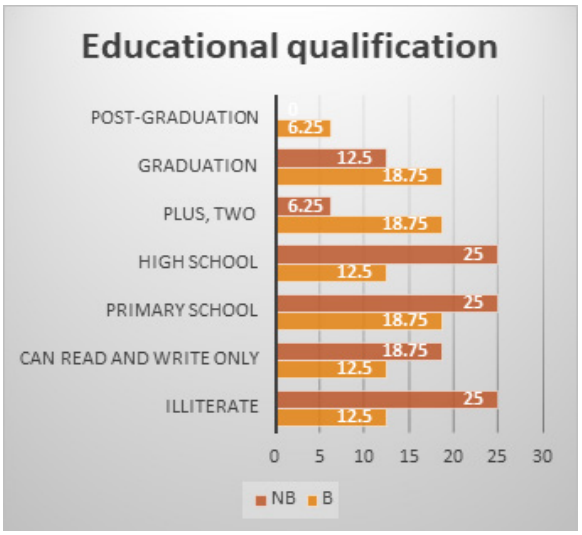


Table 9. Educational qualification of the respondents

2.	Educational qualification	Beneficiary		Non-Beneficiary	
	Illiterate	1(6.25)	3(18.75)	2(12.5)	4(25)
	Can read and write only	3(18.75)	5(31.25)	2(12.5)	3(18.75)
	Primary school	4(25)	3(18.75)	3(18.75)	4(25)
	High school	3(18.75)	2(12.5)	2(12.5)	4(25)
	Plus, two	1(6.25)	2(12.5)	3(18.75)	1(6.25)
	Graduation	3(18.75)	1(6.25)	3(18.75)	2(12.5)
	Post-Graduation	1(6.25)	--	1(6.25)	--



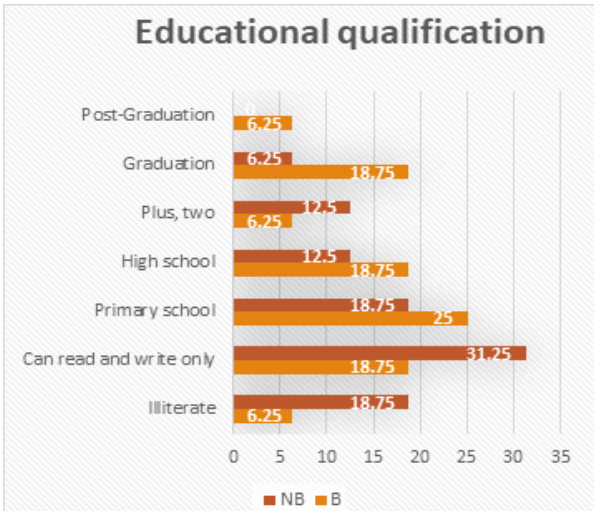
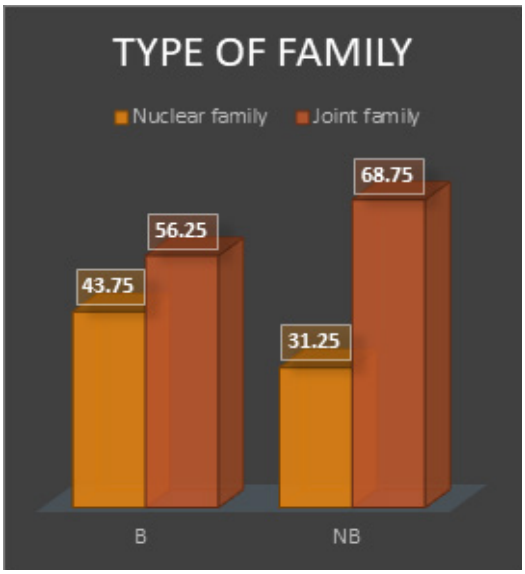


Table 10. Classification of the respondents based on Family Type

1.	Type of family	Beneficiary		Non-Beneficiary	
	Nuclear family	7(43.75)	5(31.25)	9(56.25)	5(31.25)
	Joint family	9(56.25)	11(68.75)	7(43.75)	11(68.75)



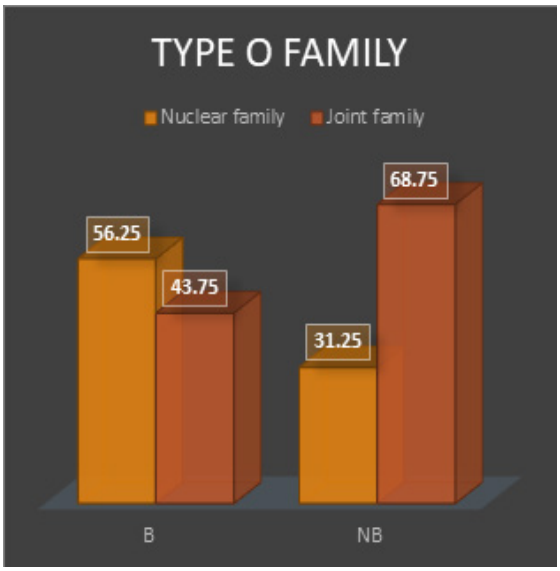
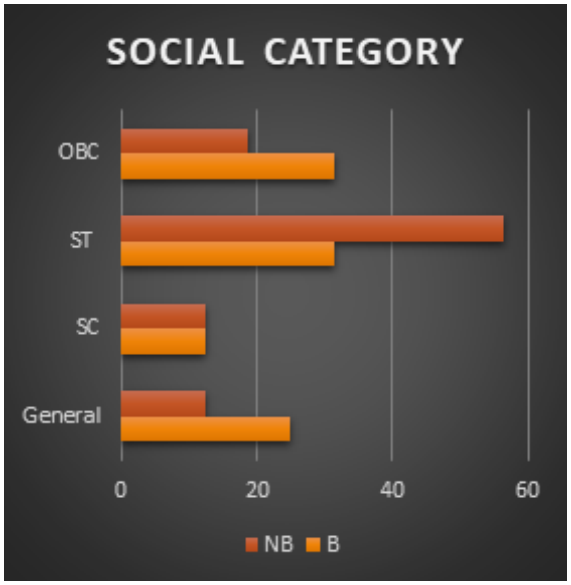


Table 11. Classification of the respondents based on Social Category

1.	Social Category	Beneficiary		Non-Beneficiary	
	General	4(25)	2(12.5)	8(50)	2(12.5)
	SC	2(12.5)	2(12.5)	3(18.75)	2(12.5)
	ST	5(31.25)	9(56.25)	4(25)	6(37.5)
	OBC	5(31.25)	3(18.75)	3(18.75)	6(37.5)



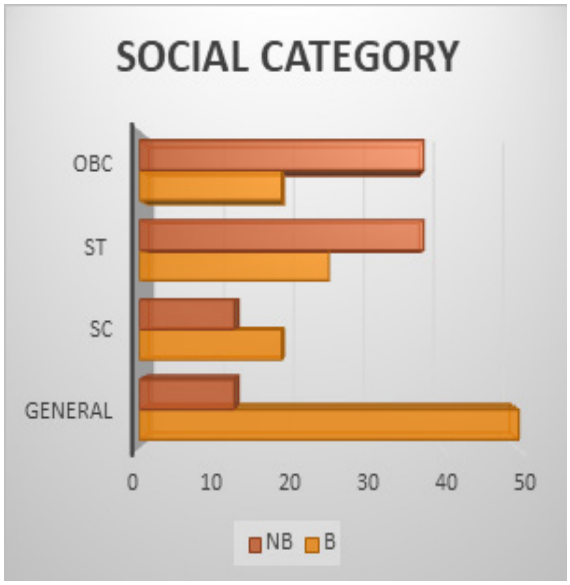
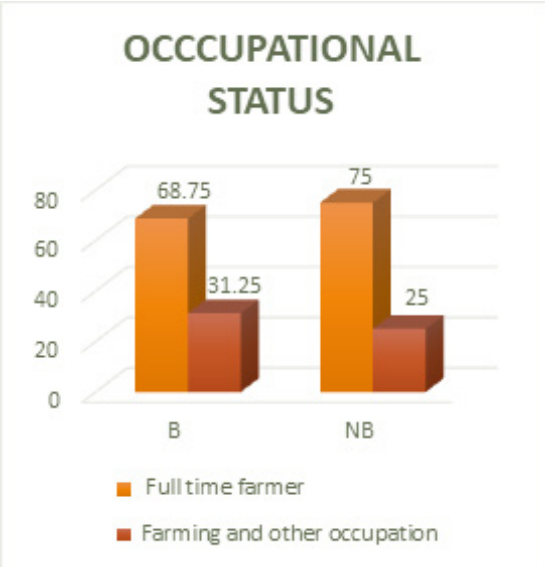


Table 12. Classification of the respondents based on Occupational status

1.	Occupational status	Beneficiary		Non-Beneficiary	
	Full time farmer	13(81.25)	10(62.5)	11(68.75)	12(75)
	Farming and other occupation	3(18.75)	6(37.5)	5(31.25)	4(25)



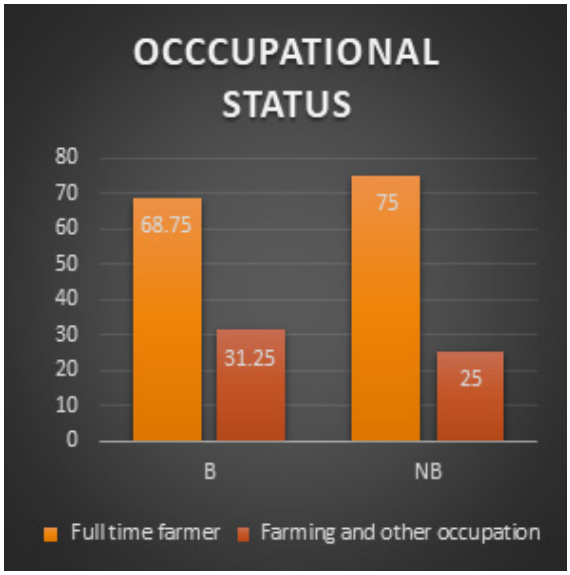
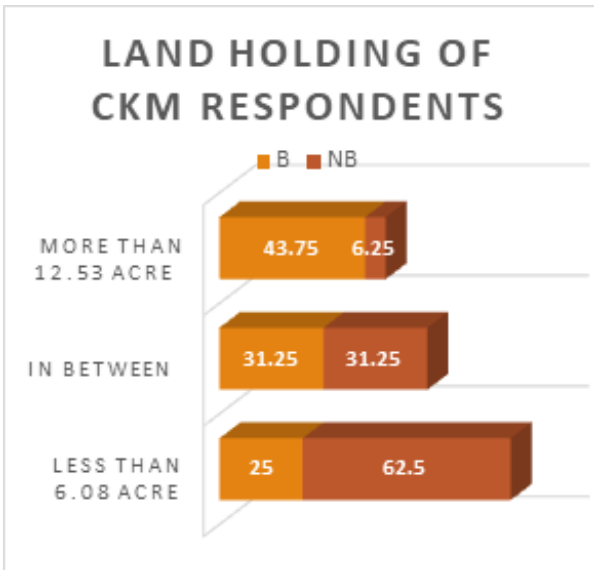


Table 13. Classification of the respondents based on Land Holding

1.	Land holding	Beneficiary		Non-Beneficiary	
	Less than 6.08 Acre	3(18.75)	6(37.5)	4(25)	10(62.5)
	In Between	6(37.5)	10(62.5)	5(31.25)	5(31.25)
	More than 12.53 Acre	7(43.75)	0	7(43.75)	1(6.25)



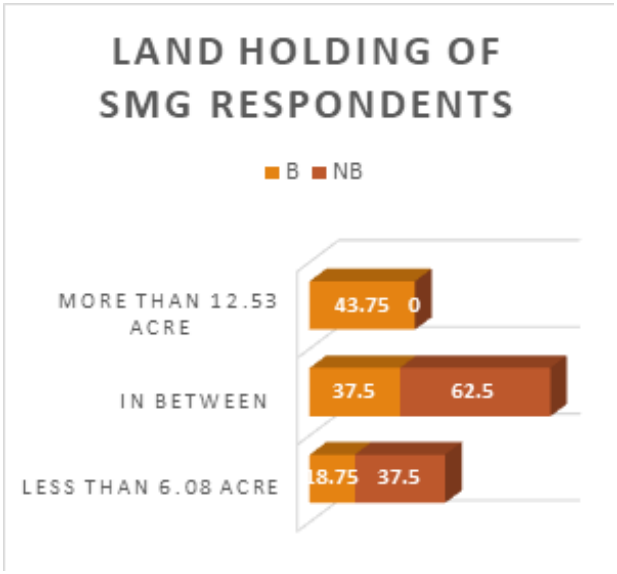
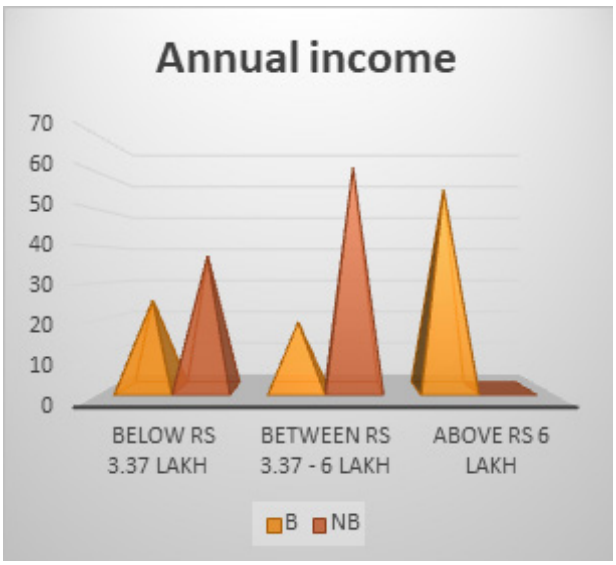


Table 14. Classification of the respondents based on Annual Income

1.	Annual income	Beneficiary		Non-Beneficiary	
	Below Rs 3.37 lakh	4(25)	6(37.5)	7(43.75)	4(25)
	Between Rs 3.37 - 6 lakh	3(18.75)	10(62.5)	3(18.75)	8(50)
	Above Rs 6 lakh	9(56.25)	0	6(37.5)	4(25)



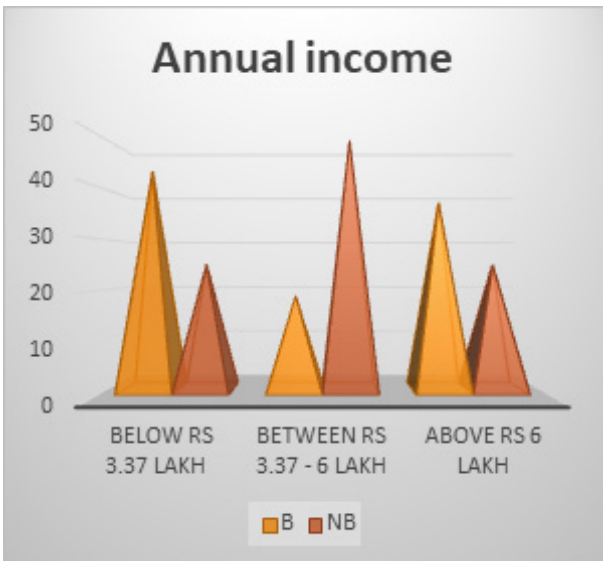


Table 15. Classification of the respondents based on agriculture activities involved in rising income

Sl No.	Allied agriculture activities				
1	Cattle	7(43.75)	8(50)	6(37.5)	6(37.5)
2	Goat	3(18.75)	1(6.25)	3(18.75)	1(6.25)
3	Poultry/Duckery	3(18.75)	2(12.5)	4(25)	2(12.5)
4	Piggery	2(12.5)	4(25)	0	3(18.75)
5	Fishery	1(6.25)	1(6.25)	2(12.5)	1(6.25)
6	Rabbit	-	-	-	-
7	Bee keeping	-	-	-	-
8	Plantation	11(68.75)	9(56.25)	10(62.5)	5(31.25)

Table 16. Extension orientation of the respondents

Extension Contact of the respondents

Sl. No.	Characteristics	Chikkmagaluru		Shivamogga	
		Beneficiaries	Non-Beneficiaries	Beneficiaries	Non Beneficiaries
		f (%)	f (%)	f (%)	f (%)
1.	**Agriculture scientist**				
	Regular	4 (25)	-	2 (12.5)	2 (12.5)
	Often	5 (31.25)	2 (12.5)	5 (31.25)	2 (12.5)
	Never	7 (43.75)	14 (87.5)	9 (56.25)	10 (62.5)
2.	**AO/ HO**				
	Regular	8(50)	11(68.75)	6(37.5)	8(50)
	Often	5(31.25)	3(18.75)	7(43.75)	4(25)
	Never	3(18.75)	2(12.5)	3(18.75)	4(25)
3.	**Private consultants**				
	Regular	3(18.75)	2(12.5)	4(25)	1(6.25)
	Often	5(31.25)	1(6.25)	5(31.25)	1(6.25)
	Never	8(50)	13(81.25)	7(43.75)	14(87.5)
4.	**Bank Agril. Officer**				
	Regular	7(43.75)	5(31.25)	11(68.75)	6(37.5)
	Often	6(37.5)	8(50)	4(25)	9(56.25)
	Never	3(18.75)	3(18.75)	1(6.25)	1(6.25)
5.	**Agro input dealer**				
	Regular	10(62.5)	12(75)	9(56.25)	14(87.5)
	Often	4(25)	2(12.5)	5(31.25)	1(6.25)
	Never	2(12.5)	2(12.5)	3(18.75)	1(6.25)
6.	**Progressive farmer**				
	Regular	8(50)	10(62.5)	9(56.25)	8(50)
	Often	5(31.25)	4(25)	4(25)	5(31.25)
	Never	3(18.75)	2(12.5)	3(18.75)	3(18.75)

Extension Participation of the respondents

Sl. No.	Category	f (%)	f (%)	f (%)	f (%)
1.	**Method demonstration**				
	Regular	7 (43.75)	4 (25)	8 (50)	4 (25)
	Often	5 (31.25)	6 (37.5)	2 (12.5)	3 (18.75)
	Never	4 (25)	6 (37.5)	6 (37.5)	9 (56.25)
2.	**Result demonstration**				
	Regular	8 (50)	3 (18.75)	7(43.75)	1 (6.25)
	Often	4 (25)	6 (37.5)	2(12.5)	9 (56.25)
	Never	4 (25)	6 (37.5)	7(43.75)	6 (37.5)
3.	**Krishi mela**				
	Regular	10 (62.5)	5 (31.25)	8 (50)	4 (25)
	Often	5 (31.25)	5 (31.25)	5 (31.25)	3 (18.75)
	Never	1 (6.25)	6 (37.5)	3 (18.75)	9 (56.25)
4.	**Campaigns**				
	Regular	2(12.5)	1(6.25)	3 (18.75)	3 (18.75)
	Often	5(31.25)	2(12.5)	4 (25)	5 (31.25)
	Never	9(56.25)	13(81.25)	9 (56.25)	8 (50)
5.	**Training programme**				
	Regular	5(31.25)	2(12.5)	6 (37.5)	3 (18.75)
	Often	4(25)	7(43.75)	7 (43.75)	5 (31.25)
	Never	7(43.75)	7(43.75)	3 (18.75)	8 (50)
6.	**Exhibition**				
	Regular	5(31.25)	4(25)	6 (37.5)	3 (18.75)
	Often	6(37.5)	6 (37.5)	7 (43.75)	2 (12.5)
	Never	5(31.25)	6 (37.5)	3 (18.75)	12 (75)
7.	**Field day**				
	Regular	4(25)	3(18.75)	6 (37.5)	4 (25)
	Often	5(31.25)	5 (31.25)	3 (18.75)	5 (31.25)
	Never	7(43.75)	8 (50)	7 (43.75)	7 (43.75)
8.	**Field visit**				
	Regular	7(43.75)	1 (6.25)	6 (37.5)	2 (12.5)
	Often	6 (37.5)	3 (18.75)	5(31.25)	1 (6.25)
	Never	3 (18.75)	12 (75)	5 (31.25)	13 (81.25)
9.	**Educational/Exposure tour**				
	Regular	8(50)	2 (12.5)	5 (31.25)	3 (18.75)
	Often	4(25)	1 (6.25)	5 (31.25)	3 (18.75)
	Never	4(25)	13 (81.25)	6 (37.5)	10 (62.5)
10.	**Group meeting**				
	Regular	7(43.75)	8(50)	5 (31.25)	3 (18.75)
	Often	3(18.75)	3(18.75)	5 (31.25)	6 (37.5)
	Never	3(18.75)	5(31.25)	6 (37.5)	7 (43.75)

11.	**FFS**				
	Regular	8(50)	1(6.25)	6 (37.5)	2 (12.5)
	Often	5(31.25)	5(31.25)	7 (43.75)	5 (31.25)
	Never	4(25)	10(62.5)	3 (18.75)	9 (56.25)

Organizational participation of the respondents

Sl. No.	Category	f	%	f	%	f	%	f	%
1.	**Panchayat raj institutions (GP, TP, ZP)**								
	Regular	10	62.5	7	43.75	7	43.75	3	18.75
	Often	2	12.5	6	37.5	4	25	9	56.25
	Never	4	25	5	31.25	5	31.25	4	25
2.	**Dept. of Agriculture**								
	Regular	3	18.75	1	6.25	10	62.5	3	18.75
	Often	8	50	2	12.5	2	12.5	5	31.25
	Never	5	31.25	13	81.25	4	25	8	50
3.	**Dept. of Horticulture**								
	Regular	9	56.25	5	31.25	8	50	3	18.75
	Often	5	31.25	8	50	4	25	8	50
	Never	2	12.5	3	18.75	4	25	5	31.25
4.	**SAUs (UAHS)/HC**								
	Regular	6	37.5	2	12.5	8	50	1	6.25
	Often	5	31.25	6	37.5	3	18.75	5	31.25
	Never	5	31.25	8	50	5	31.25	10	62.5
5.	**Veterinary hospital**								
	Regular	2	12.5	2	12.5	8	50	3	18.75
	Often	5	31.25	7	43.75	5	31.25	9	56.25
	Never	9	56.25	7	43.75	3	18.75	4	25
6.	**Farmer producer organization**								
	Regular	5	31.25	0	0	10	62.5	9	56.25
	Often	5	31.25	0	0	3	18.75	3	18.75
	Never	6	37.5	16	100	6	37.5	4	25
7.	**Coffee Board**								
	Regular	13	81.25	3	18.75	0	0	0	0
	Often	2	12.5	7	43.75	0	0	0	0
	Never	1	6.25	6	37.5	0	0	0	0
8.	**Dairy Cooperative Society**								
	Regular	0	0	0	0	6	37.5	6	37.5
	Often	4	25	6	37.5	8	50	5	31.25
	Never	12	75	10	62.5	2	12.5	5	31.25
9.	**KVK / Research stations**								
	Regular	10	62.5	8	50	9	56.25	7	43.75

	Often	4	25	5	31.25	4	25	3	18.75
	Never	2	12.5	3	18.75	3	18.75	6	37.5
10.	**NGO**								
	Regular	9	56.25	2	12.5	11	68.75	5	31.25
	Often	3	18.75	5	31.25	4	25	8	50
	Never	4	25	9	56.25	1	6.25	3	18.75

Table 17. Mass media participation of the respondents

Sl. No.	Category	f	%	f	%	f	%	f	%
1.	**Newspaper**								
Never	Regular	5	31.25	2	12.5	6	37.5	4	25
	Often	4	25	5	31.25	3	18.75	4	25
	Never	7	43.75	9	56.25	7	43.75	8	50
2.	**Farm magazine (Negilamidita)**								
	Regular	2	12.5	1	6.25	5	31.25	2	12.5
	Often	5	31.25	1	6.25	7	43.75	5	31.25
	Never	9	56.25	14	87.5	4	25	9	56.25
3.	**Radio / AIR**								
	Regular	7	43.75	8	50	12	75	11	68.75
	Often	4	25	4	25	2	12.5	3	18.75
	Never	5	31.25	4	25	1	6.25	2	12.5
4.	**Television**								
	Regular	14	87.5	12	75	11	68.75	13	81.25
	Often	2	12.5	3	18.75	4	25	2	12.5
	Never	0	0	0	0	1	6.25	1	6.25
5.	**Internet**								
	Regular	12	75	7	43.75	10	62.5	8	50
	Often	3	18.75	3	18.75	4	25	4	25
	Never	1	6.25	6	37.5	2	12.5	4	25
6.	**Educational Films**								
	Regular	2	12.5	0	0	12	75	1	6.25
	Often	5	31.25	3	18.75	2	12.5	2	12.5
	Never	9	56.25	13	81.25	2	12.5	13	81.25
7.	**Mobile (SMS services)**								
	Regular	13	81.25	11	68.75	10	62.5	5	31.25
	Often	2	12.5	4	25	2	12.5	4	25
	Never	1	6.25	1	6.25	1	6.25	7	43.75

Table 18. Inputs

8.1 Frequency of usage of various extension services

Sl. No	Category	F	%	F	%	f	%	f	%
1.	**Mobile AES via SMS alerts**								
	Everyday	10	62.5	6	37.5	11	68.75	8	50
	1x a week	2	12.5	4	25	3	18.75	3	18.75
	2x a week	4	25	6	37.5	2	12.5	5	31.25
	1x a Fortnight	0	0	0	0	0	0	0	0
	1x a month	0	0	0	0	0	0	0	0
2.	**Public addressing system**								
	Everyday	4	25	0	0	0	0	0	0
	1x a week	3	18.75	0	0	3	18.75	2	12.5
	2x a week	2	12.5	4	25	5	31.25	5	31.25
	1x a Fortnight	6	37.5	9	56.25	4	25	3	18.75
	1x a month	1	6.25	3	18.75	4	25	6	37.5
3.	**Method Demonstration**								
	Everyday	0	0	0	0	0	0	0	0
	1x a week	0	0	0	0	3	18.75	0	0
	2x a week	2	12.5	0	0	4	25	4	25
	1x a Fortnight	5	31.25	4	25	3	18.75	8	50
	1x a month	9	56.25	2	12.5	6	37.5	4	25
4.	**Video based extension / television**								
	Everyday	8	50	7	43.75	9	56.25	4	25
	1x a week	6	37.5	7	43.75	2	12.5	7	43.75
	2x a week	2	12.5	2	12.5	3	18.75	4	25
	1x a Fortnight	0	0	0	0	2	12.5	1	6.25
	1x a month	0	0	0	0	0	0	0	0
5.	**Radio programme**								
	Everyday	5	31.25	4	25	5	31.25	6	37.5
	1x a week	2	12.5	3	18.75	3	18.75	4	25
	2x a week	3	18.75	3	18.75	2	12.5	2	12.5
	1x a Fortnight	4	25	4	25	4	25	3	18.75
	1x a month	2	12.5	2	12.5	2	12.5	1	6.25
6.	**Notice board**								
	Everyday	10	62.5	11	68.75	12	75	12	75
	1x a week	5	31.25	5	31.25	3	18.75	2	12.5
	2x a week	1	6.25	0	0	1	6.25	2	12.5
	1x a Fortnight	0	0	0	0	0	0	0	0
	1x a month	0	0	0	0	0	0	0	0

7.	**Private AES providers**								
	Everyday	0	0	0	0	0	0	0	0
	1x a week	4	25	0	0	6	37.5	0	0
	2x a week	4	25	0	0	3	18.75	0	0
	1x a Fortnight	3	18.75	0	0	2	12.5	4	25
	1x a month	5	31.25	2	12.5	5	31.25	12	75

Table 19. Level 3: Participation

9.1 Frequency of participation by the respondents in the EAS provider to seek information

A. Informal Sources

Sl. No.	Category	F	%	F	%	F	%	F	%
1.	**Friends**								
	Regular	3	18.75	11	68.75	6	37.5	12	75
	Often	9	56.25	3	18.75	8	50	3	18.75
	Never	4	25	2	12.5	2	12.5	1	6.25
2.	**Relatives**								
	Regular	4	25	5	31.25	6	37.5	5	31.25
	Often	5	31.25	6	37.5	8	50	4	25
	Never	7	43.75	5	31.25	2	12.5	7	43.75
3.	**Input dealers**								
	Regular	10	62.5	13	81.25	12	75	14	87.5
	Often	5	31.25	2	12.5	2	12.5	1	6.25
	Never	1	6.25	1	6.25	2	12.5	1	6.25
4.	**Progressive Farmers**								
	Regular	5	31.25	8	50	6	37.5	9	56.25
	Often	8	50	6	37.5	7	43.75	3	18.75
	Never	3	18.75	2	12.5	3	18.75	4	25
5.	**Local leader**								
	Regular	4	25	11	68.75	4	25	13	81.25
	Often	7	43.75	3	18.75	4	25	2	12.5
	Never	5	31.25	2	12.5	8	50	1	6.25

B. Formal Sources

Sl. No.	Category	F	%	F	%	F	%	F	%
1.	**Agri. Scientists**								
	Regular	4	25	0	0	3	18.75	1	6.25
	Often	5	31.25	2	12.5	5	31.25	3	18.75

	Never	7	43.75	14	87.5	8	50	12	75
2.	**Agriculture Officers**								
	Regular	8	50	11	68.75	9	56.25	7	43.75
	Often	5	31.25	3	18.75	3	18.75	4	25
	Never	3	18.75	2	12.5	4	25	5	31.25
3.	**KVK / Research stations**								
	Regular	10	62.5	8	50	5	31.25	5	31.25
	Often	4	25	5	31.25	3	18.75	6	37.5
	Never	2	12.5	3	18.75	8	50	5	31.25
4.	**KCC/IVRS**								
	Regular	12	75	4	25	3	18.75	1	6.25
	Often	3	18.75	4	25	4	25	5	31.25
	Never	1	6.25	8	50	8	50	10	62.5
5.	**Registered Societies**								
	Regular	1	6.25	0	0	11	68.75	8	50
	Often	5	31.25	0	0	3	18.75	6	37.5
	Never	10	62.5	16	100	2	12.5	2	12.5
6.	**ATIC**								
	Regular	8	50	2	12.5	4	25	1	6.25
	Often	3	18.75	5	31.25	3	18.75	3	18.75
	Never	5	31.25	3	18.75	9	56.25	13	81.25
7.	**ATMA**								
	Regular	2	12.5	4	25	9	56.25	8	50
	Often	4	25	8	50	3	18.75	3	18.75
	Never	10	62.5	4	25	4	25	5	31.25
8.	**NGO's**								
	Regular	9	56.25	2	12.5	8	50	1	6.25
	Often	3	18.75	5	31.25	2	12.5	3	18.75
	Never	4	25	9	56.25	6	37.5	13	81.25
9.	**FPC / PO**								
	Regular	5	31.25	0	0	13	81.25	4	25
	Often	5	31.25	0	0	2	12.5	7	43.75
	Never	6	37.5	16	100	1	6.25	5	31.25
10.	**Agri-Clinic Center/ Horti Clinic**								
	Regular	0	0	0	0	9	56.25	5	31.25
	Often	0	0	0	0	3	18.75	6	37.5
	Never	0	0	0	0	4	25	5	31.25
11.	**Coffee Board**								
	Regular	13	81.25	3	18.75	0	0	0	0
	Often	2	12.5	7	43.75	0	0	0	0
	Never	1	6.25	6	37.5	0	0	0	0

C. Mass Media Participation

Sl. No.	Particulars	f	%	f	%	f	%	f	%
1.	**Newspaper**								
	Regular	5	31.25	2	12.5	6	37.5	4	25
	Often	4	25	5	31.25	3	18.75	4	25
	Never	7	43.75	9	56.25	7	43.75	8	50
2.	**Farm magazine (Negilamidita)**								
	Regular	2	12.5	1	6.25	5	31.25	2	12.5
	Often	5	31.25	1	6.25	7	43.75	5	31.25
	Never	9	56.25	14	87.5	4	25	9	56.25
3.	**Radio / AIR**								
	Regular	7	43.75	8	50	12	75	11	68.75
	Often	4	25	4	25	2	12.5	3	18.75
	Never	5	31.25	4	25	1	6.25	2	12.5
4.	**Television**		0		0				
	Regular	14	87.5	12	75	11	68.75	13	81.25
	Often	2	12.5	3	18.75	4	25	2	12.5
	Never	0	0	0	0	1	6.25	1	6.25
5.	**Internet**								
	Regular	12	75	7	43.75	10	62.5	8	50
	Often	3	18.75	3	18.75	4	25	4	25
	Never	1	6.25	6	37.5	2	12.5	4	25
6.	**Educational Films**								
	Regular	2	12.5	0	0	12	75	1	6.25
	Often	5	31.25	3	18.75	2	12.5	2	12.5
	Never	9	56.25	13	81.25	2	12.5	13	81.25
7.	**Mobile (SMS services)**								
	Regular	13	81.25	11	68.75	10	62.5	5	31.25
	Often	2	12.5	4	25	2	12.5	4	25
	Never	1	6.25	1	6.25	1	6.25	7	43.75

Table 20. Level 5: Perceptions

1.	**Extension/farm education is important to fellow farmers to improve in farming**							
Yes	12	75	13	5.07	11	68.75	8	50
Undecided	2	12.5	2	12.5	2	12.5	5	31.25
No	2	12.5	1	6.25	3	18.75	3	18.75

2. EAS providers teach us the technique and methods of making profit out of new innovations in agriculture								
Yes	9	56.25	10	62.5	8	50	13	81.25
Undecided	5	31.25	4	25	6	37.5	1	6.25
No	2	12.5	2	12.5	4	25	2	12.5
3. The modern extension services like FPO, CHS are really improving our production and minimizing cost of cultivation								
Yes	13	81.25	10	3.90625	14	87.5	12	75
Undecided	3	18.75	4	1.5625	2	12.5	2	12.5
No	0	0	2	12.5	1	6.25	1	6.25
4. ICT based extension is providing relevant and on time information								
Yes	15	93.75	9	56.25	11	68.75	10	62.5
Undecided	0	0	0	0	3	18.75	3	18.75
No	1	6.25	7	43.75	1	6.25	3	18.75
5. SAUs/KVK's trainings, demonstrations are helpful in improving production and reducing pest incidence								
Yes	11	68.75	9	56.25	10	62.5	6	37.5
Undecided	5	31.25	7	43.75	4	25	8	50
No	0	0	0	0	2	12.5	2	12.5
6. Coffee board is the boon for coffee growers								
Yes	13	81.25	12	75	-	-	-	-
Undecided	3	18.75	4	25	-	-	-	-
No	0	0	0	0	-	-	-	-
7. NGO's extension services are reaching the ground level with relevant farm advocacy								
Yes	12	75	10	62.5	13	81.25	11	68.75
Undecided	3	18.75	4	25	2	12.5	3	18.75
No	1	6.25	2	12.5	1	6.25	2	12.5
8. Mobile based advisory service will rule the extension services								
Yes	13	81.25	15	93.75	11	68.75	12	75
Undecided	2	12.5	1	6.25	4	25	2	12.5
No	1	6.25	0	0	1	6.25	2	12.5
9. Farmer led extension is the easier and faithful source of information to adopt practices								
Yes	15	93.75	14	87.5	13	81.25	13	81.25
Undecided	0	0	0	0	1	6.25	2	12.5
No	1	6.25	2	12.5	2	12.5	1	6.25
10. Extension is all about bridging gap between the farmers and agriculture scientist								
Yes	13	81.25	14	87.5	12	75	13	81.25
Undecided	3	18.75	2	12.5	3	18.75	2	12.5
No	0	0	0	0	1	6.25	1	6.25

Table 21. Intention of EAS

Sl. No.	Particulars	F	%	F	%	f	%	f	%
1.	Information only	0	0	1	6.25	1	6.25	1	6.25
2.	Information + knowledge	2	12.5	1	6.25	3	18.75	2	12.5
3.	Information + knowledge + skill	1	6.25	2	12.5	5	31.25	7	43.75
4.	Information + knowledge + skill + attitude change	13	81.25	12	75	7	43.75	6	37.5

Table 22. Attitude of the farmers on EAS

1. Adoption of good practice advices make farming more productive								
Favourable	14	87.5	12	0	13	81.25	12	75
Unfavourable	2	12.5	4	25	3	18.75	4	25
2. AES Provide better learning environment than Indigenous technique								
Favourable	9	56.25	6	37.5	12	75	11	68.75
Unfavourable	7	43.75	10	62.5	4	25	5	31.25
3. ES improves the quality of decision making								
Favourable	14	87.5	12	75	12	75	11	68.75
Unfavourable	2	12.5	4	25	4	25	5	31.25
4. SAUs plays important role in solving the advisory needs of farmers								
Favourable	12	75	9	56.25	7	43.75	6	37.5
Unfavourable	4	25	7	43.75	9	56.25	11	68.75
5. RSKs are leading good role in dissemination of knowledge on inputs								
Favourable	12	75	10	62.5	5	31.25	9	56.25
Unfavourable	4	25	6	37.5	11	68.75	7	43.75
6. Training conducted by KVKs are helping us to improve the production and income								
Favourable	13	81.25	13	81.25	9	56.25	8	50
Unfavourable	3	18.75	3	18.75	7	43.75	8	50
7. FPOs are efficient ES source at village level								
Favourable	-	0	-	0	12	75	11	68.75
Unfavourable	-	0	-	0	4	25	5	31.25
8. ES on pest/disease out breaking warning system facilitates farmers to take preventive measures(e-SAP)								
Favourable	15	93.75	12	75	12	75	11	68.75
Unfavourable	1	6.25	4	25	4	25	5	31.25
9. ES like CHS helps to mitigate the problem of labours for marginal and small farmers								
Favourable	9	56.25	13	81.25	13	81.25	11	68.75

Unfavourable	7	43.75	3	18.75	3	18.75	5	31.25
10. AIR programmes on Agriculture motivating us to take up some income centric activities								
Favourable	10	62.5	11	68.75	12	75	6	37.5
Unfavourable	6	37.5	5	31.25	4	25	12	75
11. ICT based extension services provides the latest information for farmers								
Favourable	15	93.75	11	68.75	13	81.25	9	56.25
Unfavourable	1	6.25	5	31.25	3	18.75	7	43.75
12. Poor connectivity in rural areas is a major challenge for the successful use of ICT								
Favourable	16	100	12	75	16	100	14	87.5
Unfavourable	0	0	4	25	0	0	2	12.5
13. Face to face communication is better than ICT based extension services								
Favourable	11	68.75	15	93.75	9	56.25	13	81.25
Unfavourable	5	31.25	1	6.25	7	43.75	3	18.75
14. NGOs imparting better role in improving the livelihood of farmers by providing ES								
Favourable	11	68.75	14	87.5	10	62.5	11	68.75
Unfavourable	5	31.25	2	12.5	6	37.5	5	31.25
15. Time barrier could be significantly reduced by extension approach like Mobile advisory/ KCC/IVRS								
Favourable	15	93.75	10	62.5	13	81.25	12	75
Unfavourable	1	6.25	6	37.5	3	18.75	4	25
16. ES of Coffee board is boon for coffee growers								
Favourable	15	93.75	12	75	-	-	-	-
Unfavourable	1	6.25	4	25	-	-	-	-

Impact of Good Practice in Agricultural Extension on farmers of Chikkmagalauru and Shivamogga districts with respect to various aspects such as change in knowledge level, family income, family expenditure pattern, family saving pattern, social status, social satisfaction, livelihood, health improvement and decision taking ability of beneficiary farmer of various agriculture extension services is shown in the Fig 3 and Fig 4 respectively.

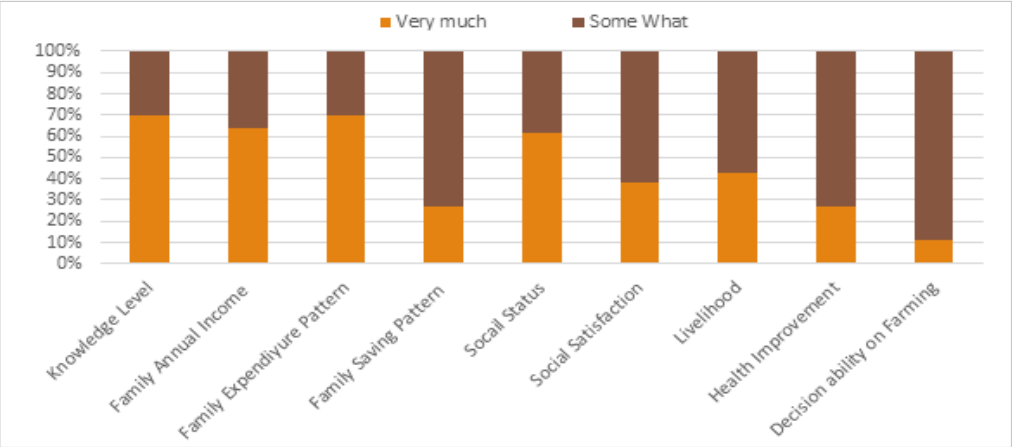


Fig 3 Impact of Good Practices on Chikkmagaluru Beneficiary Farmers

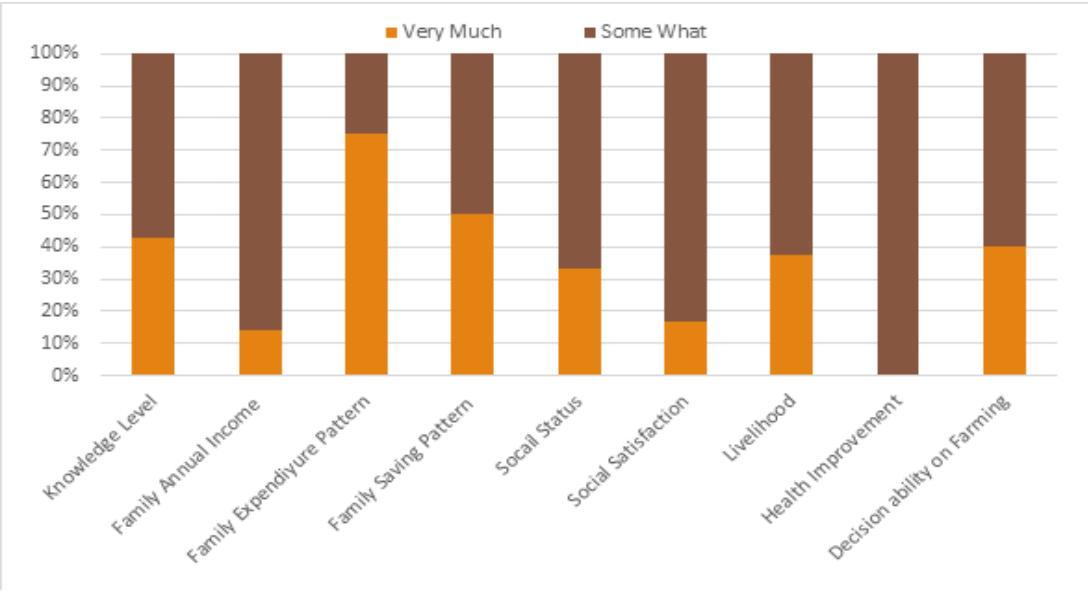


Fig 4 Impact of Good Practices on Shivamogga Beneficiary

The total of 64 farmers constitutes the sample size of study, on which 32 beneficiaries and 32 non beneficiaries of good agricultural extension practices were considered for the impact assessment. It is found that 62.50 % of beneficiaries adopted the land preparation , 81.25 % adopted variety/ seed, 87.50 % followed right sowing time, 68.75 % practiced manure and fertilizer dosage, 75.00 % engaged in weed management, 87.50 % adopted in water management, 81.50 % followed Plant Protection measures, 75.00 % adopted harvesting and threshing technology, 81.25 % has adopted drying and storage, 87.50 % has adopted weather related information, 62.50 % has adopted post-harvest techniques, 43.75 % has adopted warehouse technology and 87.50 % utilized the market information provided by various agricultural extension service providers in the Chikkmagalauru district.

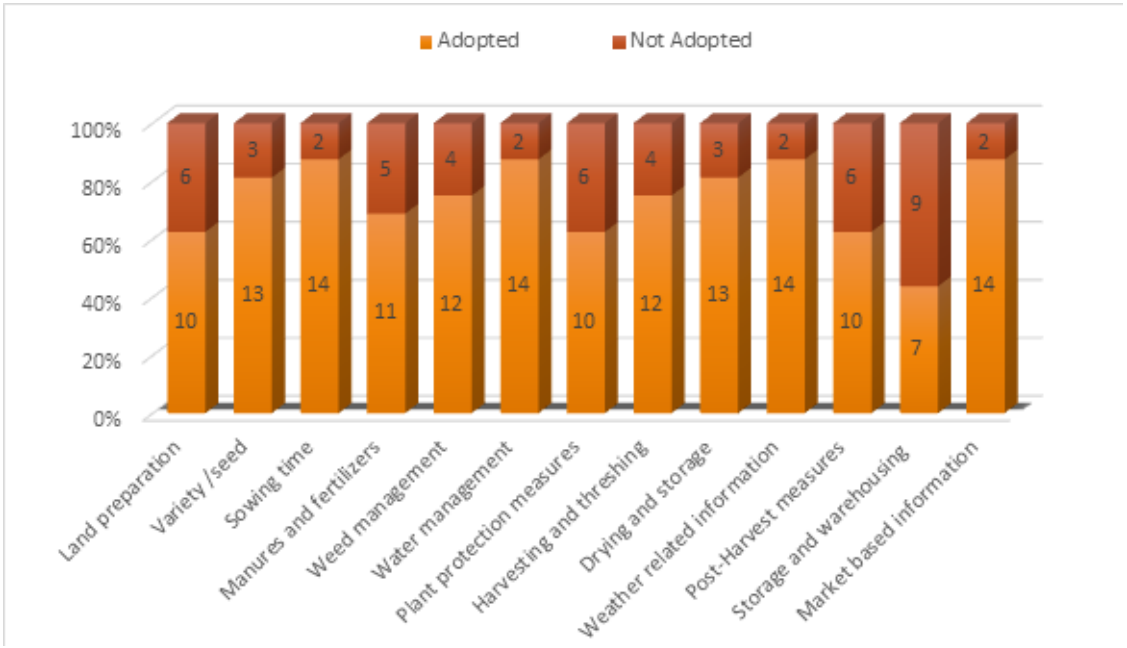


Fig 5. Practice Change among beneficiaries of Extension Services in Chikkmagaluru

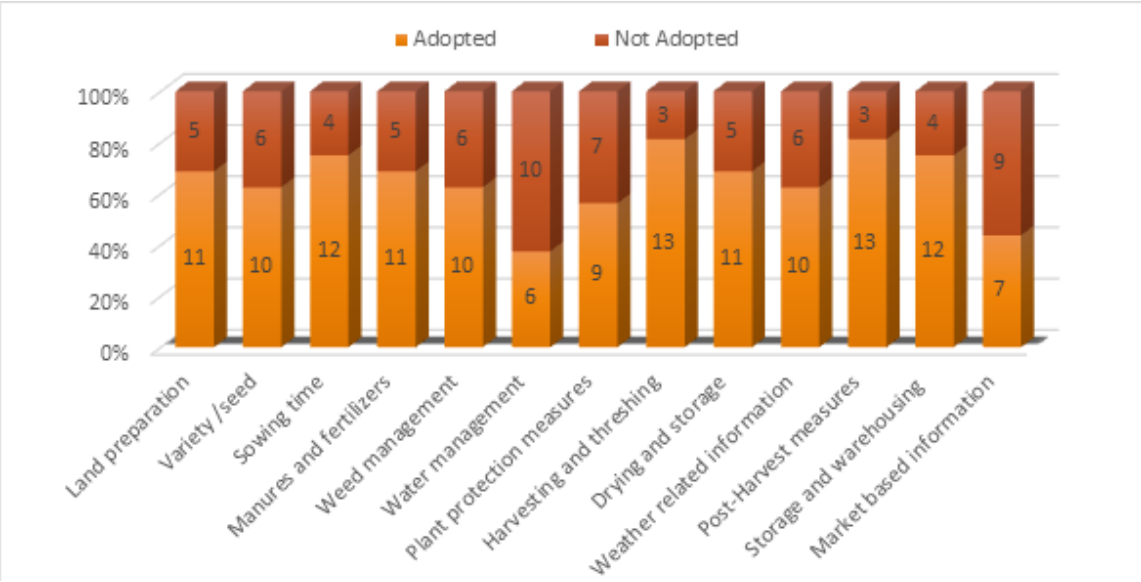


Fig 6. Practice Change among beneficiaries of Extension Services in Shivamogga

From above Fig. 6, it is found that practice change in the beneficiary farmers of good agricultural extension practices in the Shivamogga district 68.75 % of beneficiaries adopted the land preparation , 62.50 % adopted variety/ seed, 75.00 % followed right sowing time, 68.75 % practiced manure and fertilizer dosage, 62.50 % engaged in weed management, 37.50 % adopted water management, 56.25 % followed Plant Protection measures, 87.50 adopted harvesting and threshing technology, 81.25 % has adopted drying and storage, 68.75 % has adopted weather related information, 87.50 % has adopted post-harvest techniques, 75.00 % has adopted warehouse technology and 43.75 % utilized the market information provided by the various agricultural extension providers including SAU, civil societies, FPO etc.

Table 23. Extenssion linkages of KVK with other organizations in Karnataka

Sl. No.	Name of organization	Nature of linkage
1.	Department of Agriculture	• Joint diagnostic survey • Joint implementation of FLD's • Bi-monthly workshops • Collaborative training programme under ATMA • Joint field visits • Demonstration under ATMA • Joint diagnostic survey, Conducting training programmes and demonstration, seminars, Krishi Abhiyana and field visits
2.	Department of Horticulture	• Joint diagnostic survey • Collaborative training under NHM project • Field visits

		• Technology Demonstration • Joint diagnostic survey, Conducting training programmes and demonstration, seminars, nursery accreditation and field visits
3	Karnataka state Dept. of Animal Health & Veterinary Sciences	• Collaborative training • Joint implementation of animal health camps, vaccination camps, mass deworming and nutrition management of dairy stock and calf management • Technology demonstration of Feed formulation etc.,
4.	Karnataka State Sericulture Dept.	• Collaborative training; technology demonstration
5.	Karnataka State Dept. of Fisheries	• Technology demonstration and training under NFDB
6.	Dept. of Industries and commerce	• Collaborative training
7.	All India Radio	• Technology dissemination
8	Doordarshan & Private TV Channels	• Technology dissemination
9.	Information and Broadcasting Dept.	• Technology dissemination & publicity
10.	Financial institutions like NABARD & Nationalized co-operative banks	• Formation of self-help groups • Collaborative training programme
11.	Input agencies	• Formation of self-help groups • Collaborative training programme
12.	Self Help Group	• Technology dissemination & organizing training
13.	Non-Governmental Organizations (SKDRDP, Jana Spandana)	• Conducting training programmes and demonstration
14.	Coffee Board, Spice Board	• Conducting training programmes, Joint diagnostic survey
15.	MANAGE, ATMA, DATC	• Conducting training programmes
16.	Local village level youth clubs	• Organizing training programme & field demonstration
17.	Co-operative sectors viz., milk producers, co-operative society, water user's co-operative society etc.,	• Health camps and training programmes
18.	SAU / College of Agriculture	• Involving RAWEP in conducting - Training Programme - Method demonstration • Group meeting & field visits
19.	Dept. of marketing and Co-operation	• Awareness & training programme on go down schemes
20.	Department of Panchayath raj and rural development	• Training
21.	Coconut development Board	• Training

22.	Protection of Plant Varieties and Farmers' Rights Authority, New Delhi	• Training
23.	UAHS, Shivamogga	• Interaction Meet, Krishi Mela, Training, Seminar, Workshop
24.	Rural development and self-employment training institute	• Training

Conclusion

In this study, various good practices in agricultural extension and methods of approaches used by different service providing sectors like public, private and civil societies to disseminate information in the South Karnataka which have been in practice were identified and there are many innovative methods yet to come in practice. Thus, the good practices in extension by different sectors in agricultural extension impacts positively on the livelihood of farmers but due to lack of linkages and institutional support to the NGOs and FPOs which are being easily accessible by farmers directly as they exist in rural areas and working at ground level in agriculture advisory services which need to be considered for policy making in order to achieve effective and reliable advocacy to the farmers in the field of agriculture and in allied sectors. There is a need of focus on enhancing collective farming and marketing which is reducing possible risks in production. Agriculture extension is not only restricted to the transfer of technology, in fact it should be beyond, that is in terms of purpose-specific, target-specific, need-specific and enabling farmers to help themselves in improving the livelihood in an efficient way.

Recommendations

Encouragement to the collective farming

As extension services are also given by Farmer Producer Organizations, effective capacity building of extension personnel of organizations is needed.

Improved Information and Content development

Information created and disseminated digitally by extension agent using mass media should be trained in content development in authorized manner.

More emphasis should be given on ICT based extension

Digital media is providing real time information by overcoming time barriers thus ICT based extension like mobile apps, information kiosks, what's app messaging can be given more importance.

Enhanced funding, convergence and co-ordination

In the view of effective coordination among the various players in the field of agriculture extension, funding should be doubled and policy can be drawn in order to facilitate coordination among public and other stakeholders convergent towards achieving the aims of extension effectively.

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Pragathi Bandhu Groups

Developed by SKDRDP, **"Pragathi Bandhus"** are unique models of male-member Self-help Groups that center around the cultivation of waste lands through labor sharing. Such groups organize and empower small and marginal farmers and laborers through the transference of governance to the village level. By promoting compulsory labor sharing for performing individual and community tasks, each village member works for the other members for one day in a week. This has helped thousands of small farmers to complete their important farm works.

A five year farm plan prepared by the members in consultation with the group and the Sevaniratha provides the much-needed help to families. Through such collective action, the community can implement watershed construction and development programs. Pragathi Bandhu groups also provide micro-credit assistance primarily for land development, creation of infrastructure and personal emergency needs. They organize themselves into federations and the sub-committees of the federations and study the credit requirement of the groups to make recommendations for credit loans.

The Pragathi Bandhu model has now been approved by the National Bank for Agriculture and Rural Development and has achieved the significant milestone of being adopted for the implementation of Joint Liability Group (JLG). JLGs are 5 to 10 member groups formed in each project village that act as mutual guarantee groups for bank/MFI credit.

Krishi Mela

Kissan Mela is a major annual event and is a platform for farmers, specialists and agriculture scientists from different parts of the state to share and exchange ideas. It is a forum to acquire skills, technology and updates on the latest developments in the field of agriculture. Beside farmers, manufacturers of agricultural equipments, fertilizers, pesticides, seed and seedling dealers, nurseries, banks and financial institutions and government departments participate in this mega event. The Mela inspires confidence among the farmers and provides rural artisans with their own space to display their skills and sell their products.

Krishimela are annual events and they attract a large footfalls. Hence Seminars are conducted on various subjects relevant to the agricultural community. The topics included are water and soil conservation, significance of mixed cropping, women on path to success, role of Self Help Groups in the development of dry land agriculture, microfinance programs. interviews with administrators and political leaders are also done. TO promote agriculture top notch farmers are felicitated in these functions.

Dignitaries from various departments were present at the Mela as subject matter specialists who could shed light on various topics. The crowd-puller is the exhibition cum bazaar, which brought people together to shop and to exchange information. Videos on health and sanitation, nutrition and rural development were shown continuously. Folk artists have an opportunity to exhibit their talents and their handicrafts at the Mela. Cultural programs showcasing yakshagana and dances are organized in the evenings. The highlight of the Mela is the cattle show, which had more than 400 entries in the past. Various breeds of cattle were exhibited and the finest were honored with an award too in the past events. There are around 400 stalls on average in the mela and it normally witnesses close to 300,000 visitors.

Animal Husbandry

Animal Husbandry is an agricultural practice of breeding and raising livestock. Many farmers are of the opinion that animal husbandry is not necessarily profitable as farmers look for direct benefits such as milk and meat and ignore indirect benefits like manure and gobar gas.

SKDRDP conducts regular awareness camps and demonstrations on animal husbandry to educate farmers on the full range of products that animal husbandry can be used for. SKDRDP constructs low cost sheds, compost and vermi units and gobar gas units. The organization also introduces modern technologies and exotic breeds and high yielding fodder grass varieties such as Azola in order to increase the income of farmers.

SKDRDP has also expanded its services to become a corporate agent of National Insurance Company and has formally popularized animal insurance for cattle.

Agriculture Extension

SKDRDP brings in science and technology to help farmers improve the yield and efficiency rate of farming their agricultural plots. The organization works together with local government line departments and research institutions to gather and transfer information to the project offices.

Each project is provided with exclusive services of agricultural and dairy technologists to guide the farmers and teach them new technologies and agro practices that expand their capabilities. For instance, field level workers are continuously trained in simple cropping techniques for regenerative and sustainable agriculture.

Expert specialists are invited to give lectures to groups of 40 to 50 farmers on government policies, horticulture and subjects related to agriculture. Such lectures focus on the existing local problems of the farmers. Progressive farmers and other eminent think tanks are also invited for training programs and demonstrations to share their experience.

SKDRDP also motivates farmers by bringing them on study tours to showcase what other progressive farmers have achieved. This may also include visits to research stations within or outside the district. Study tours may be synchronized with Kissan Mela. Such tours expose farmers to the possibilities of technological adoption and replication for their own farms.

Other agriculture extension programs include introducing high yielding varieties of crops, encouraging organic farming, liaising between the farmers and research centers, encouraging native inventions and conserving the environment.

4. Agricultural Development: During the year 9.60 lakhs members took up various agricultural and allied activities involving horticulture, dairying, floriculture, animal husbandry, bee keeping etc. During this period, 9,300 dug wells, 9,500 pump sets, 12,200 irrigation systems were implemented by the members. Similarly, 11,600 tillers, 500 harvesting machines were purchased by the farmers for mechanizing the farming. Many of these farmers have received Government subsidies for acquiring the machinery. 13,000 farmers adopted SRI method of paddy cultivation in 13,000 acres of land. This has resulted in overall increase in paddy yield. A total of 14,300 environment programs, 7,500 watershed programs have been implemented. Organic village concept is being implemented in 6 villages of DK, Udupi, and uttara Kannada Districts with the help of Government of Karnataka. Under this programme Rs. 58.00 lakhs has been utilized.

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MNS is undertaking Agriculture equipment rental service under the Yanthra Dhara scheme of Government of Karnataka and providing agri equipments and subsidized rates to its member farmers.

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We undertake analysis of a soil sample to determine nutrient content (NPK and micro nutrients, composition, and other characteristics such as the acidity or pH level.

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NEERA- We are the first farmers company in Karnataka got the licence from government to produce NEERA. It is a nature's gifted nutritious health drink.

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MNS has storage, credit facility and marketing facility for all variety of areca nut. MNS is also in the process of developing integrated areca nut processing machine.

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INTENSIVE AGRICULTURE ADVICE SERVICE

MNS is promoting intensive and multi crop culture among its member farmers. As part of this initiative MNS has already distributed black pepper saplings to among its members to cultivate it in their areca nut farm.

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(An organisation of Ministry of Agriculture and Farmers' Welfare, Govt. of India)
Rajendranagar, Hyderabad – 500 030, Telangana State, India
www.manage.gov.in