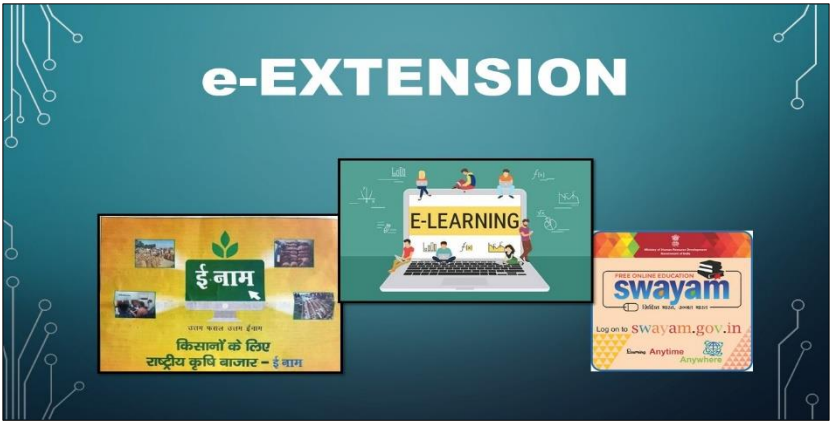
Practical Application of e-Extension



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Preface

Extension Education and Extension Service activities are largely involved in the dissemination of innovations among various stakeholders. As a student of agriculture and allied sciences or as an extension professional it is essential to know the historical aspects of e-Extension, how the journey was made to arrive at the current status. Understanding the favourable as well as limiting conditions to exploit the potentials of ICTs for extension services are also essential for stakeholders.

This book covers the process of e-extension and how education and extension services can be extended beyond the limits of four walls and in such exercises how information technology can act as a tool are the key issues. Development of appropriate content suitable for the specific stakeholder is the challenge for the agricultural researchers and extension service providers. Extension educationists are creating such platforms wherein professionals can come together and using IT tools provide e-Extension services to the communities.

Content

Chapter - 1

Introduction to e-Extension

What is e-Extension?

E-extension is also knowns as cyber extension. It is defined as the extension over cyber space. Cyber extension means using the power of online networks, computer communications and digital interactive multimedia to facilitate dissemination of agricultural technology. It is simply as the use of electronic technologies (especially ICT) to enhance face to face and paper based transactions. These technologies can be as simple as teleconferences or as complex as wikis and blogs. It includes effective use of ICT, national & international information networks, internet, expert systems, multi-media learning systems & computer based training systems to improve information access to the farmers, extension workers, research scientists and extension managers.

Changing Trends of Agricultural Extension

As farmers adopt new technical recommendations such as new varieties, fertilizers recommendations and pest management practices for their staple food crops, they merely modify and fine tune their existing production systems, because there were no major changes in existing farming systems, the dominant extension model used in most developing countries was technology or information transfer which required no significant changes in the cognitive skills of farmers. It is observed the increasing worldwide supply and demand for staple food crops in most countries, as well as increasing fertilizers and other input costs, are directly affecting the price and profitability of food crops. Most small scale subsistence deal with rapidly changing agricultural economy. Another major change is the rapid increase in economics growth occurring in most developing countries. The majority of this economic growth are occurring in urban areas an increasing demand for fruits, vegetables, livestock and fish production. This growing demand for high value products, then they must first learn about new production, processing, and marketing system to determine whether they can successfully pursue one or more of these new enterprises.

With the help of e-Extension, we can achieve a better extension system with fastest transfer of technology. As governments shift household food security among the rural poor, then the focus of public extension system must be broadened to pursue a more diversified farming strategy. In the view of emerging trends and technologies, there are new applications suggested by the e- extension for the benefit of farmers.

Chapter - 2

Practical Application of e-Extension

2.1 Digital Green

It is an innovative digital platform for community engagement. How the community can be engaged in the process of dissemination of the messages? So generally we perceive that the people who are working under the research system are responsible for generation of knowledge and dissemination of knowledge. But under many circumstances the experienced farmers can also act as resource persons. The advantage with these experienced farmers as well as the progressive farmers is, so the command over the practices; the agricultural practices. And at the same time they can deliver these messages in their regional languages. Not only in regional languages, in their regional dialects. So how to make them resource person is the basic issue of this Digital Green.

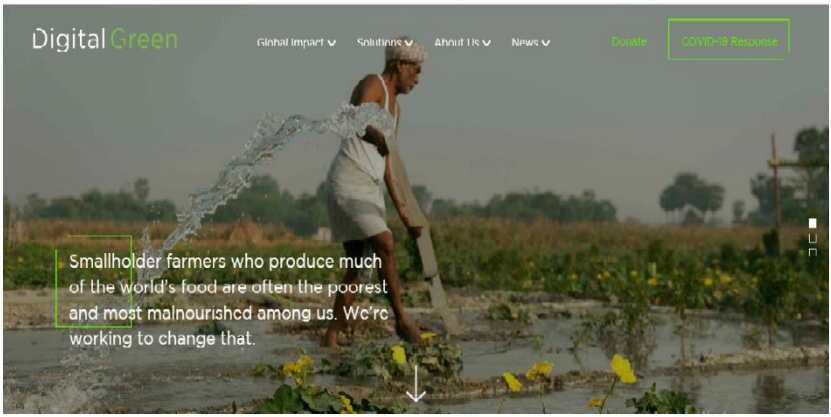

Image source: https://www.digitalgreen.org

This project was conceived as a Microsoft Research India's technology for emerging markets, basically in 2006 by Mr Rikin Gandhi. Looking into the potentials and the services that we can provide to the society with this methodology, Rikin Gandhi in the year 2008 thought "let us make it an independent non-governmental organization". That is the Digital Green So just to make it popular among the people, involvement of the community. He

developed 2 games, that is Wonder Village and Farmer Book for giving them the information and for attracting them, so that they can be a part of this particular activity. So the Vision of Digital Green includes, to create a world where all individuals live a life of dignity. It is not that somebody else is coming over to you and he is trying to provide you dignity. But it is with your own involvement you can lead a dignified life. So that is what is the process that is being facilitated by the Digital Green.

The Mission is to integrate innovative technology because all the time they are talking of technology. The global development effort to improve the human wellbeing. So technology is a means, but the end goal is to achieve the well-being of the human-beings. The Value Systems that the Digital Green has adopted includes the humility, excellence, accountability, empathy and integrity. And how these things are being practiced. So that we will be looking into their experiences.

The approach adopted by Digital Green includes,

1. The participatory process for video production on improved livelihood practices. There are number of practices that the farmer is taking up. when we look into the agricultural operations, since generations they are following these things but the only thing that is essential is how can we make minor modifications in these practices. how can we communicate these practices to the fellow farmers or the community at large. So that is what is, where the participation of the end-users is very essential and Digital Green is ensuring that.
2. the second issue, that is the human mediated learning model for video dissemination and training. Because the experiments on video production are not new. In the late 1970's and early 1980's the organization known as SEWA (Self Employed Women's Association), they also documented number of videos, and they disseminated this information among the different parts of the country, through their volunteers and through their organizations. The process of video production during those period was totally different. The process of video production under Digital Green is with modern technology with electronic mediation and we can disseminate these messages in a very easy manner.
3. Then hardware and software technology platform for data management. In those days the videos produced were stored in the form of video disk or the hard disk. But here digitally you can manage all these things and you can bring in lot of modifications into these

technologies at regular intervals.

4. An iterative model to progressively address the needs and interests of the community, with analytical tools. Because the preferences, the choices, the needs of the people are changing at regular intervals, and accordingly so the Digital Green can take care of those things and satisfy the needs of the society The basic data management software has the feature of Connect-online as well as Connect- offline So this is what is the unique feature that is adopted under Digital Green. So the details that will be looking into the further discussions. Comparison If we compare the efforts of Digital Green with those of traditional extension service providing mechanisms. So the cost in case of Digital Green is 10 times lesser than the traditional mechanism of delivery of extension services. And if we compare the adoption of innovations with the help of this Digital Green efforts, is 7 times more than the traditional extension efforts. So this is what is the drastic change that the electronic mediation has brought into the paradigm of technology transfer. So that is where we feel the potential of the technologies, especially in case of information dissemination and information dissemination itself is known as the development dissemination.

Role of Digital Green

To promote the agricultural growth by providing development messages.

To promote nutritional securities among the rural people.

To disseminate the information through videos.

To integrate technology for quality training.

To increase income through the improved market access.

Digital Green has produced more than 5000 videos in 50 languages. So these figures are itself an indicator, to what extent that this organization is working. Because development of videos in the regional languages, in regional dialects is an uphill task. And making use of the grassroots people as a resource person; that is another thing wherein huge amount of capacity building efforts are needed. So this is how the team of Digital Green is working.

2.2 MOOCs for Agriculture

The term MOOC is an acronym of massive open online course. The first element is the massiveness. It allows access to large number of learners. In the

traditional education system, we have limitations like, in a particular class we cannot have admissions maybe, 50, 100, 250, 200; Whatever it is, the numbers are fixed by the competent authorities. So we cannot think of beyond that. But in case of MOOCs we can have number of people. It may be in few thousands or few millions, so it may go beyond that also.

Image source: https://www.agmooc.in

In a formal education we have number of restrictions, that these are the age limits and these are the prerequisites to offer this particular course or to be part of this particular educational mechanism. There are no restrictions as well as there are no prerequisites so this is the open for everyone. The third element is online. Because we are serving huge number of people across the geographical area. So online digital platforms are the only way wherein, we can reach these many number of people. Then basically it is a course. It has its own syllabus, it has its own educational content and it has its own methodology to deliver. And they conduct the test and ultimately certificates are also being issued. So that is why we call it as a course. Put together it becomes a Massive Open Online Course.

Agricultural Education in India Now coming to the Agricultural education in India. Agricultural education in India is being imparted with the help of 75 State Agricultural Universities, 4 Central Universities with the faculty of agriculture. Some colleges which are affiliated to the traditional universities. And number of private institutions which are affiliated to different State universities. So this is what is the educational infrastructure that we have in case of agricultural education. They are admitting the students based on their own criteria. Somebody is having the National level entrance test. Somebody is having the State level entrance test.

The concept of **e-PG Pathshala**, launched by the University Grants

Commission. The number of lectures that were video recorded and they are put on this particular platform with the help of Inflibnet, and so they are accessible to all. Topics are available in Pdf format. Any student, any learner can download them. The video lectures are also available. But they are not offering a particular course in the form of MOOCs. But the video lectures are available, the Ppt's are available, the Pdf format in the form of notes are available.

AgMOOCs platform is one of the important platform in providing the MOOCs for the students of agriculture. So far 14 courses have already been developed by registering, about 2 lakh students have already been benefited out of these 14 courses. So still the efforts are continuing to offer the latest developments in the courses as well as according to the syllabus of students of agriculture and allied sciences.

Swayam is managed by University Grants Commission, so wherein the people are educating themselves with the help of this Swayam. Now the Swayam is also becoming mandatory for the students and they are also offering the courses as a part of your syllabus. So universities are slowly entering into that mode. So that student maybe belonging to arts stream, science, or law, management etc faculties. So they can offer the courses online. And they can get the benefits of that.

The National Platform for Technology Enhanced Learning is focusing on the engineering education in India. And they have also developed a number of courses. The entire undergraduate as well as the syllabus has been covered with this **NPTEL courses.**

NAARM has also offered some courses for the benefit of faculty members as well as students. So these are some of the efforts that are being made in Indian context.

Features of this agMOOCs platform

- AgMOOC is a user friendly format.
- The registration process is very simple.
- It has an access to all the courses offered. Once you register. Maybe you are registering for a particular course. But you can access all the courses that are on that particular platform.
- The contents are available in audio, video as well as the Pdf formats and agMOOCs app has made the accessing the course of agMOOCs platform very very simple. So it is an excellent example for m-Learning also. Which we discussed in one of our previous

discussions. So wherein just by using this app you can have access to all the courses.

- There is a mechanism of monitoring of attendance. So as a learner your attendance is also being monitored on this particular platform. If your attendance is less than 80%. So even though you complete the examination successfully. You will not be offered certificate because of your lack of attendance. So that kind of systematic monitoring mechanism is there.
- Then offline availability of the course contents is another feature, which helps students who are facing some issues with the connectivity.
- There are number of announcements that are being announced by the administrators at regular intervals, they are always available on the announcements section.
- Then static as well as the dynamic resources are also there. The static resources the PPt's are available, videos are available. As well as the dynamic resources(web links) are also available.
- The forums are there to put your views and get answers to the doubts. Students can always ask the question. The number of questions that we are facing for MOOCs that are being offered. And those things are being addressed by the concerned course instructors.
- The Hangouts for chat with the fellow learner. So this provides an excellent opportunity for every learner to have their own community, to establish new friendships and new circles on their own.

2.3 Open Education Resources (OER)

Definition

It is an educational content created by institutions and published for free access by the target communities via internet under intellectual property licenses. There are two important issues that we need to identify Number one the educational content is open and free access for the entire population and there is the concept of intellectual property license.

Image source: https://www.enunesco.org

History of OER

It begins with the MIT open course project, on "global open education resource movement"- 2001.The term was adopted by UNESCO in 2002, that OER (Open Educational Resource) this term was adopted in 2002 on a forum on the "Impact of Open Courseware for Higher Education in Developing Countries"

- The open educational resources movement comprised of.
    1. Open Courseware (OCW)
    2. Open Publishers
    3. Open educational resources Repositories
    4. Publicly funded initiatives

Principles Then the principles of open educational resources include.

- Reuse: the first one is the reuse. The people are allowed to use all or part of the work for their own purpose. You can download it, you can save it, and you can reuse at any point of time, because you are free to do that. So that's what is the openness means.
- Redistribute: Then redistribute. You can share the downloaded contents with your peer group, with your students, or with your co-learners etc, so that they are also getting the benefits of these things.
- Revise: You can revise it. People can adopt, modify, translate or change the work. For example, a book written in English can be translated into Hindi audiobook.
- Remix: Then you can go for remixing of that. People can take two or more existing resources and combine them to create a new resource.

So the already existing material can be combined and a new thing can be created.

- Retain: No digital rights management restrictions. The content is yours to keep, whether you are the author, or you are the instructor using the material or a student. So you can easily retain the contents that you have downloaded or that you have obtained from any of the open educational resources.

2.4 Vikaspedia

It is a Government of India initiative. It was launched in the year 2014, with the objective of providing e-Content and using ICT based applications for societal empowerment. A number of areas were taken into account for providing the services. This portal is available in 23 Indian languages. The 6 domain areas include agriculture, health, education, societal welfare, energy and e governance. These are the basic areas that the Vikaspedia is covering.

Image source: https://www.vikaspedia.in

Vikaspedia Portal

- Any individual or volunteer can contribute the content. Edit the content or comment on the existing content also. So it is similar to the efforts of the Wikipedia.
- Then contributed content is validated by the identified experts, and moderated by the State nodal agencies in the respective States. It means, that it is not that what the crowd is telling is going to be true. There are lot of valid contents that are available. But that needs to be further validated by the experts, so which are being appointed by the government, who will be going through the contents that are provided by the crowd sources. Then ultimately that takes the proper shape to place in the website.

- Similar to Wikipedia. But with more reliable and authentic content in the local languages, specific to that particular region for which that this content is being developed.

Information Services

The information services include in the local languages. It may include the success stories, the technologies, best practices, govt schemes. So this can be the areas, so wherein you can provide the information.

- It can be presented in any of the multimedia products.
- Anyone can design the e-Learning courses.
- Anyone can think of value added courses like (e-Vyapar, Ask an expert, question/answer forum)
- The health related issues are also being covered by this Vikaspedia.
- The content related to education, which covers issues like the child rights, then policies and schemes, child corner, teacher's corner etc., which gives an opportunity for the learner.
- Similarly the social welfare which emphasizes on empowering the marginalized and the rural communities. The various issues associated with the women are being covered here, by giving appropriate information.
- e-governance page is there giving lot of information regarding various govt schemes etc. if you look into the e-governance, it becomes very relevant that. So availability of the information regarding government schemes.
- Presently, there are more than 140 projects related to agriculture and allied sciences are in operation. But how many of the farmers are aware of this, out of 140 projects or the program schemes that are for the benefit of farmers.

Vikaspedia – Current Status

Currently, Vikaspedia is hosting more than 14,000 web pages are there and the multimedia continent including audio is of about 2330 mins and video for about 13, 923 mins been developed. It is having 26 million page views per month and 8405 content volunteers across 10 languages, who are working for development of content for Vikaspedia.

2.5 e-NAM

It is basically an electronic trading portal. Which seeks to network the

existing Agricultural Produce Marketing Committees(APMC) and other market yards, to create a unified national market for agricultural commodities. There is a beautiful marketing network that is throughout the country, so wherein there are number of APMC's that are working. So now all these things, APMC's are being connected electronically, so that they can exchange the price, they can exchange the commodities. Their arrival and at what price they are being sold etc. are being exchanged electronically, so that it gives an opportunity for the farmer to trade his produce.

Image source: https://www.enam.gov.in

About e-NAM

The National Agricultural Market is an effort to create a national network of existing mandis, which are already existing. But now there is only an effort to link them electronically, which can be accessed online. It seeks to enable buyers situated outside the State, to participate in trading at a local level. So earlier there were also restrictions that the farmer of one State cannot enter into another State for the purpose of trading, for the purpose of selling his produce. But now with this, so the entire country is acting as a particular village.

Vision

The vision of e-NAM is to promote uniformity in agricultural marketing by

- Streamlining the procedure across the integrated market. So earlier there used to be a policy for each State, for each region. But now the entire country has the same policy for trading as well as marketing of agricultural produce.
- Removing information asymmetry between buyers as well as sellers.

So some of the buyers were having huge amount of information and some were not. And some of the sellers were having appropriate information, many were not. So this information asymmetry was removed, because all are having equal access to this information contents.

- Promoting the real time price discovery based on the actual demand and supply. So what exactly is the demand in the market and accordingly how the price is behaving is determined by this particular effort.

Mission

The integration of APMC's across the country to a common online market platform to facilitate Pan-India trade in agricultural commodities.

Providing better price discovery through transparent auction process, based on quality of produce along with the timely online payment.

Stakeholders

- The farmers, who are the primary producers
- And they themselves are translating themselves into the traders when they harvest the product.
- APMC is basically a marketing place wherein the farmers are the members
- The Farmer Producer Organization(FPO), because the marketable surplus of each and every farmer is not much, looking into the Indian situations. The small holdings. So that is why farmers are organizing themselves into farmer producer organizations, so that they have a bulk production, they have a bulk commodity to sell in the market.
- As well as the Mandi board which are supported by the State as well as Central Govt. Need for NAM The need for NAM arises because of
- The APMC regulated market yards limit the scope of trading in agricultural commodities as per the previous norms, but now they are being opened up.
- So even within the State there are transaction costs on moving the produce from one market to another area. So that was the traditional system. The earlier system that was having. But NAM is going to overcome all these problems.
- The multiple licenses are necessary to trade in different markets in

the same State. So each and every trader was having a license to engage into the trading of agricultural commodities in one market. If you want to enter into another market, so then he has to have another license. So this multiple licensing also came to an end with the introduction of this National Agricultural Marketing System.

NAM Intends to Reverse the Process

- Fragmentation of markets
- Lowering the intermediation cost
- Wastage and price for the final consumer. Because ultimately the farmer should get all the benefit of all these efforts. So that is what is the basic idea here.
- It builds on the strength of the local mandi, and allows it to offer its produce at the national level So now the farmer should feel proud because he himself is entering into the trading process, number one, and he can sell his produce at the best possible price and to the intended customer.

The Basic Criteria for a State to Plug into the National Agricultural Market is

1. The State APMC Act must have specific provisions for electronic trading. So now because agriculture being a State subject, the State has to modify its norms, so that they can be part of this NAM (National Agricultural Market)
2. Then the State APMC Act must provide for issue of licenses to anyone in India to trade through the National Agriculture Market in the local Mandis. This type of modifications is to be brought into the APMC Act in every State, so that they can be part of this National Agricultural Marketing System.
3. Then there must be one single license for each State to facilitate trading in all Mandis of the State. It is not that multiple license, but it should have a single license and a single point levy for transaction fee. The transaction fee also to be charged at once. It is not that multiple fees that you are charging. So with these modifications a particular State can be a part of the National Agricultural Market.

Benefits of Direct Marketing – NAM

The farmers are getting the higher share in the consumer rupee. Because whatever the consumer pays in Indian context, only 25% is going to the

farmer, and 75% to the marketing channel. So now farmer becoming a trader with e-NAM, so he can get the additional benefit in the market. Marketing cost is minimized because the primary producer is involved into this process. lower transaction cost because of the modification of the APMC Act. Reducing the multiple licenses, reducing the transaction fees etc.

Non-monetary benefits to the farmers

- Number one the farmers directly come in contact with the consumers and come to know about the consumer's requirement also. Earlier, so there was a middleman who was explaining all these things. But now these middlemen are eliminated.
- Farmers as well as the final consumers, so they are having face to face situation.
- It reduces the post-harvest losses of the produce because there is no time gap in after harvest as well as its sale to the end user.
- Then farmers increase their efficiency by access to the better technologies, because they are becoming part of this electronic mode, obviously they will be beneficiaries.

Chapter - 3

e-Extension Initiatives of Institutions

3.1 e-EXT-ICAR

Indian Council of Agricultural Research is a nodal agency for agricultural education, research as well as extension at the national level. Apart from conducting the research on various agricultural commodities. It also develops the policy for its marketing as well as its extension related activities. So now we are in the era of information communication technology revolution, wherein largely the ICT mediation is there in delivering extension services and how ICAR making use of these. So let us have a look at them. Initiatives by ICAR This is an indicative list of the e-Extension initiatives of Indian Council of Agricultural Research.

Rice Knowledge Management Portal. RKMP(www.rkmp.co.in)

Vision: The vision of this Rice Knowledge Management Portal is to serve the wide range of stakeholders and help in better planning to realize higher productivity and production of rice through improved knowledge and skills with the help of this portal.

- Basically this acts as a comprehensive repository of knowledge regarding the rice cultivation and the management of the rice crop. The extension and the farmer domains on this portal provide production knowhow, the knowledge related to the production, package of practices, frequently asked questions in English as well as in local languages. So this motivates the farmer to be a part of this particular portal.
- It caters to the information needs of exporters and farmers through the trade information system. So it is not only the farmers, even the exporters are the beneficiaries of RKMP
- Then indexing of mandi prices from regulated markets with the help of the data from the Agmarknet helps the farmer to take the appropriate decisions, but the commodity that they are dealing with is only one; that is rice.

Consortium for e-Resources in Agriculture (CeRA)

- It is a consortium of agricultural libraries under ICAR for National Agricultural Research and Extension System libraries. So, so far there are 152 members under this CeRA.
- It deals with online access of select journals in agriculture and allied sciences to all researchers, teachers and students, policy planners, administrators and extension personnel, who are part of this National Agricultural Research System through IP authentication Means the entire knowledge that is being generated, related to agriculture and allied sciences are brought under one platform and made available to each and every stakeholder of agricultural research, education as well as extension system.

Objectives of CeRA

- To upscale the existing R&D research and development information resource base of Indian Council of Agricultural Research institutions/State Agricultural Universities, comparable to world's leading institutions as well as organizations. Because the international agencies are becoming stronger because of their huge amount of information base.
- To subscribe online journals/e-resources and create e-access culture among scientists, faculty members, ICAR institutions and the agricultural universities. The students, faculty members as well as the researchers are becoming part of this, so that we can develop the electronic access culture among these people.

KRISHI (Knowledge based Resources Information Systems Hub for Innovations in agriculture).

It is a centralized data repository system of the Indian Council of Agricultural Research consisting of technology, data generation through experiments, surveys, observation studies etc, based on the geospatial data, publications, learning resources etc. are brought under a common platform, so that you can analyse it and come to the logical conclusion.

Objectives of KRISHI

- To develop knowledge repositories related to proven technologies and publications. There are number of State Agricultural Universities and there are number of ICAR institutions who are coming out with technologies on a regular basis. All these things are being consolidated on one platform.

- To create agricultural geo-portal for strengthening visualization and analysis of this spatial data. So country is very large and diverse in nature. There are a number of cultural aspects as well as the agro-climatic aspects that are involved. Based on that whatever the things that are being developed in different parts of the country are brought under one platform.
- To develop agricultural knowledge portal, to provide access and manage this knowledge repository is another objective. Mobile Apps Then coming to the mobile apps. ICAR so far has developed 117 apps on different areas of agriculture and allied sciences. Just to quote here, some of them, that is,
- The Herbal Kisan, which is focusing on the medicinal plants. The detailed information for the farmers, students, drug manufacturer regarding medicinal and aromatic plants and their cultivation techniques are provided through these mobile apps. Farm Calculator Then coming to the farm calculator which is one of the important innovation that has been contributed by the Indian Council of Agricultural Research that we can say.
    - The farm calculator emphasizes on the fertilizer calculator,
    - pesticide, fungicide and herbicide calculator
    - Then the plant population calculator,
    - Seed rate calculator
- The seed blending calculator So these are some of the very trivial issues in agricultural operations. So once we have customized mechanism for calculation of the fertilizer, the pesticide requirement, then the plant population, seed rate etc.

ICAR Mushroom App

It is designed for mushroom growers, mushroom entrepreneurs and mushroom researchers as well as the students.

Objectives of Application

- To popularize mushroom cultivation and its nutritional as well as medicinal values, so that it can become a very good alternative for nutrient supplement.
- Then to notify the interested mushroom entrepreneurs for mushroom training. So you can get the training calendar also related to mushroom.

- Then to promote crop advisory to mushroom growers. What are the precautions that he has to take and what are the options and opportunities that are available.
- To provide information about newly developed mushroom technologies by the Indian Council of Agricultural Research—Directorate of Mushroom Research. So these are some of the benefits of making use of this mushroom app.
- Weekly alerts on weather, disease forecasts and market information. So this makes and this empowers the farmer, because they are getting the information from the resource centers, the valid centers.
- Then alerts on important trainings and other programs through the farmer's clubs, and self-help group networks under the Krishi Vigyan Kendra. So it provides various other information in addition to the weather as well as the disease forecast.
- It is an efficient tool to disseminate development to farmers and empower them to face the challenges of upcoming free market.

e-Dalhan Gyan Manch

- So which is the product of the Indian Institute of Pulse Research situated in Kanpur. So which is providing all the information about the pulse crops and every related aspect of pulse farming in the entire country.

KIRAN – **Knowledge Innovation Repository of Agriculture in the North-East** KIRAN is another effort which is focusing on the North-Eastern part of India, which has a huge potential specially in case of horticulture crops and the untapped potential is there, but the government now is focusing on that particular part.

Objective of KIRAN

- To create a knowledge and technology repository for the north-eastern region. So looking into the geographical area of the north-eastern region, which is hilly in nature and their cultural aspects and their religious aspects.
- To foster the linkage amongst the partners and collaborate with the State as well as the regional organizations. So that their network becomes stronger, the linkages become stronger.
- Act as a catalyst to strengthen the existing institutional capacity through convergence and networking.

- Then the next objective is to provide technology and development consultancy along with the details of technology dynamics and kinetics.
- Last objective is to develop programs for sustainable agricultural development in the region and provide support for future strategy formulation in research as well as extension.

Expert System on Seed Spices

The seed spices have the highest prices in the market and there is huge amount of international demand. So that is why the cultivation of seed spices is going to generate additional income for the farmer.

The expert system is providing the complete information about the seed spice production management in the entire country.

- It covers the important spices like the cumin, fenugreek, coriander, fennel, nigella, dill and ajowain.
- It advises on the basis of area, cultural and climatic conditions and other characteristics of the farmer interest, that gives you advice whether you should go for this crop and in what season you should go for this and all this advisory that you will be getting.
- It suggests the appropriate cultural practices like field preparation, fertilizer application, schedule of irrigation etc.
- Also this expert system guides on protecting seed crop from the insect, diseases, weeds etc.
- It also provides the solutions to the problems faced by the farmers through online queries.

3.2 e-EXT-SAU

There are more than 75 State Agricultural Universities who are providing education in various disciplines of agriculture and allied sciences, and number of privately owned colleges affiliated to some universities. And some deemed universities are also involved in teaching, research and extension activities. We will be focusing our discussion on the initiatives of State Agricultural Universities.

Kerala Agricultural University

- KAU agri-infotech portal
- E-Crop doctor
- online courses.

So it is a one stop solution for the farmers, wherein once they enter into this portal by registering themselves, they can get access to a number of services that are being offered by this portal. This portal is covering the issues like e-Krishi Pataskala and, they are offering courses for farmers, extensionists, students and farm entrepreneurs, groups and other agri-stakeholders. Then coming to the training workshops for the farmers and extensionists which are being organized are flashed on this portal. So that you can be part of this particular system.

Tamil-Nadu Agricultural University

TNAU agritech portal, which is one of the most interesting as well as comprehensive agritech portal that we can see,

- Which provides information related to agriculture and allied sectors
- It is supported by Rashtriya Krishi Vikas Yojana(RKVY)

Punjab Agricultural University (PAU kisan app)

Punjab Agricultural University has developed an App which will provide information about the crops, weather, seed, training, kheti sandesh and advisories etc etc. This App is basically for the purpose of farmers. So this is how the Punjab Agricultural University is providing services to the farmers.

Goat Farming

The app of goat farming developed by Guru Angad Dev Veterinary and Animal Sciences University. So because animal husbandry is one of the allied enterprises of agriculture, which helps in increasing the income of the farmers. This allied enterprises, they derive their inputs from agriculture only. But by maintaining these enterprises, so both the enterprises; the crop husbandry as well as the animal husbandry are mutually benefited. Until and unless we make the animal husbandry strong, the agricultural enterprises are also not becoming strong. So that is why allied enterprises are to be given due importance so that is how the animal based app is being developed to provide the information related to the care and management of this goats for the purposes of farmers. Pig Farming Then coming to pig farming another allied enterprises of agriculture. So the same university Guru Angad Dev Veterinary and Animal University, is through this app it is providing the information related to pig farming for the farmers.

Bihar Krishi App

The community radio station of Bihar Agricultural University is one of the most popular example in the entire State. So people are responding to the maximum extent as far as this community radio station is considered. In addition to that they have Bihar Krishi App, which is providing location specific information to the farmer, and at the same time they have Bihar agro-doctor also, so which provides solutions to the farmer.

Phone-in Live Programs:

Rythu Mitra: State of Andhra Pradesh, which is launching a program related to the live phone-in program, popularly known as Rythu Mitra. Acharya N.G. Ranga Agricultural University is hosting this program in collaboration with the Dept of Agriculture (Govt of Andhra Pradesh) and TEJA channel. It's a privately owned channel. So the timing is 6:30 to 7:00 in the morning and 6:00 to 6:30 in the evening. The pre-recorded programs usually 3 programs of 10 minutes each on agriculture, horticulture and animal husbandry and other allied fields are being broadcasted through this TEJA channel

Anand Agricultural University is providing the information related to the soil health card, which is one of the most successful case in the State of Gujarat, that we can say. The analysis of the soil properties and the application of fertilizers, based on the result of the soil health card. So once you enter into the portal and you provide your credentials, and the results of the soil health analysis once you provide into this portal. So that gives you the recommendation ki what are the fertilizers that you can go for your crops.

Prof Jayashanker Telangana State Agricultural University Then coming to the efforts of (PJTSAU) so which created in the year 2001. So they established in the ATIC building.

- So the public and private TV channels telecasting this agricultural programs.
- So university became the knowledge partner of this and the channel started providing them the communication support. So this is how they started broadcasting the program.
- Then the production of video capsule programs, digital videos, video discs, Quickies and jingles, information kiosks and agricultural portals are some of the other initiatives of PJTSAU.

Indira Gandhi Krishi Vishwavidyalaya, Raipur

They have developed the Krishi Gyan portal, which provides information on the cultivation aspects of all crops that are grown in the State. It is again one stop solution for the entire State. This is the only agricultural university that we find in the State, and which is providing all information at one point of time.

Tamil Nadu Dr J Jayalalithaa Fisheries University Then coming to the DJJFU, which has developed the Fish Technology portal, which provides information about rearing of fish, management, nutrition of fish for their growth and development etc etc. Means the fish farmers are the real beneficiaries of this particular initiative. So this examples of the efforts that are being made by the State Agricultural Universities reveal that the location specific situations.

With the help of software support as well as the experts belonging to the State Agricultural Universities and the various research institutions as well as some of the most experienced as well as progressive farmers are becoming a part of such initiatives, so that the ultimate information is reaching to the end-users who are the real beneficiaries. So this is in a nutshell about the e-Extension initiatives of State Agricultural Universities. In the next chapter we will be taking up say the e-Extension initiatives that are supporting the allied sector of agriculture and the allied enterprises.

3.3 e-EXT-Allied sector

The allied sectors are becoming strong and directly they are dependent on the outputs of agriculture. once they become strong, it gives additional strength to the farming community and that is how they can strengthen their agricultural practices also. There is a symbiotic relationship between the agriculture as well as its allied enterprises.

e-Pasuhaat

The concept of e-Pasuhaat. It is the web portal of Ministry of Agriculture & Farmers Welfare, Govt of India under the Dept of Animal Husbandry, Dairying and Fisheries.

Aims and Objectives of e-Pasuhaat

1. To provide e-trading support for the farmers for livestock germplasm and related services. Maintenance of the germplasm and when it is required for artificial insemination. Providing this germplasm is one of the important issue. So maintaining the pedigree is another important issue, which are being done with the help of this e-

Pasuhaat.

2. e-Pasuhaat is intended to connect the farmers with the breeders of Central, State, cooperative as well as the private agencies. So the breeding aspects are very very important in case of animal management. So that is why the regional, the local, State level as well as national agencies are coming on a common platform with the help of this e-Pasuhaat.
3. it is real time, authentic and certified information on availability of germplasm is there because this portal is being managed by the Govt of India.
4. centralized repository of information of Central as well as the State Govts. So this purpose is also being served with the help of this e-Pasuhaat. Pashu Poshan.
5. Another e-Extension effort by the National Dairy Development Board known as the Pashu Poshan. So they launched this mobile app for recommending balanced diet for cows and buffaloes. If you look into the cost of production of milk, especially in case of animal husbandry. 70% of the cost is on its nutritional management and the feed management. So under such circumstances you can imagine the importance of giving a balanced diet to the animals. Farmers should provide the complete animal profile like the breed, age, milk production, the fat content in the milk; apart from the food items being currently fed to the animal along with their cost. So based on this basic information, the app is going to recommend you which are the combinations that you need to follow, and what is the quantity that is to be fed, maybe in the morning, afternoon, evening. Like that it gives you the complete information related to the nutrition. Right now more than 5 crore farmers are the subscribers of this Pashu Poshan app of NDDB. So this is an indicator that how popular these initiatives are.

ICAR—CIRB Bhainsa Janan

Central Institute of Research on Buffaloes, which has come out with the Bhainsa Janan. So app related to the buffalo reproduction. To impart the knowledge for buffalo owners and guiding the veterinarians. So this particular app provides the basic information on different areas of buffalo reproduction. The major areas covered include,

- Targets of reproduction

- Puberty
- Sexual maturity
- Heat symptoms
- Breeding methods Pregnancy diagnosis
- Peripartum care
- Bull selection

Management for the breeding purpose all these are the priority areas of this particular app of CIRB, known as Bhainsa Janan m-Krishi Fisheries then coming to m-Krishi Fisheries. So fisheries is another important sector. India is having the vast coastal region of around 5000 kms. So which makes this particular enterprise very profitable enterprise.

The app which was developed by the Tata Consultancy Services in collaboration with the Central Marine Fisheries Research Institute(CMFRI) and The National Center for Ocean Information Services(INCOIS). These three institutions put together developed this m-Krishi fisheries app. So basically they try to provide information regarding the density of fish that are available in the seas, and it advises the farmers to go for fishing and where the dense population is available.

Vanami Shrimp App

Shrimp is another important aquatic enterprise. The Indian Council of Agricultural Research and this Central Institute of Brackish water Aquaculture (CIBA)has developed this shrimp app, which provides the technical support to the shrimp farmers, entrepreneurs, and the extension personnel and connects them to the scientific community. So basically the shrimp farmers they can ask their questions with the help of this App and they can get solutions for the problems what they are facing apart from the basic information that the App is already providing. Dairy Kannada So there are apps in the regional language also.

The Dairy Kannada app which was developed by Jayalakshmi Agrotech, private sector involvement is there. So they are providing animal husbandry support in their regional languages, which is equipped with the high end analytics and decision support system in the regional language. With interactive audio-video content it delivers the information by breaking the literacy barrier. Even illiterate farmer can be the beneficiary of this app because the video contents are already available in this App.

Training Calendar

Tamil-Nadu University of Veterinary and Animal Sciences has developed a training calendar for the purpose of farmers, specially the animal husbandry farmers. Farmers can view their upcoming events in training calendar, so that they will come to know that, which types of trainings that are being organized by the institutions and whether he is eligible for those trainings or not. Then apart from that it gives a number of other extension services to the farmers also IVRI

Pashu Prajanan App

The Indian Veterinary Research Institution, which is situated at Bareilly. So they have developed an app known as the Pashu Prajanan app. Basically this app was designed by Indian Veterinary Research Institute as well as Indian Agricultural Statistical Research Institute, New Delhi. They put together developed this app. So this is a ready reckoner for the graduating veterinarians, veterinary officers and livestock entrepreneurs about the reproductive problems of cattle and buffaloes and measures to treat and control them. So this particular app is an educational input for a student and it is an instrument for the professional for providing the extension services, and for the researchers so they can keep on adding the values to this. It provides the basic information on artificial insemination in cattle as well as buffaloes. So there are a number of biological issues that are associated with this particular app. Reproduction as well as artificial insemination is considered.

- So this app is available in a number of regional languages like Hindi, English, Punjabi, Assamese, Bengali, Gujarati, Tamil, Malayalam. So now we can imagine the importance of this app and the application of this app, that are being used by the farming communities.

Marine fish sales app

This app is developed by the CMFRI (Central Marine Fisheries Research Institution), so which connects the farmers as well as the fishermen and the consumers on the same platform. It is a multivendor e-commerce tool for the farmers. To facilitate the direct sale between the fisher folk and the customers. So the primary fisher folk who are catching the fish now they can directly sell their fish to the consumers with the help of this app. The app envisions reasonable prices. There are no middlemen which are allowed. So with this the primary producers can maximize their profits with the help of this app.

Swine App

This app is developed to deliberate the latest technical knowhow for the

farmers as well as entrepreneurs. The pork is in high demand in the society. So that is how pig farms are becoming very popular among the farming communities.

- There is lot of importance regarding the pig farming and different breeds of pigs, because of its high demand in the market.
- This particular app is giving you the information regarding the selection and breeding planfor the pig farm.
- Reproduction, management, feeding as well as housing.
- Diseases and health calendar for the pigs. Every aspect associated with the pig farming are being provided with the help of this Swine app. Another allied enterprise of agriculture. So which again this crop is being cultivated on the farm itself. So that is known as the silk.

The Resham Bandhu app, even though the silk cultivation is in the limited areas in different parts of the country. But this is giving additional income to the farmers. This particular app is designed and developed to provide the useful information as a user friendly reliable tool for the silk farmers. The issues related to moriculture, cultivation of sericulture, reeling, then human resource development and extension activities. So all these informations are being provided with the help of this Resham Bandhu app to the farmer.

So some more Apps for the Allied sector include the

- AASAN is the mobile based milk collection system for the societies, which facilitates the process of milk collection from the farmers by the societies.
- The Directorate of Poultry Research has developed an app providing information about the germ plasm, the technologies developed, poultry breeding, then poultry seed project, latest news related to poultry etc.
- The AHD digital extension app. This gives access to the information, informative materials, reports, news, alerts and other publications related to the Animal Husbandry Dept of Govt of Kashmir

Sericulture calendar

It is a software, which guides the farmers about the activities to be carried out in case of sericulture. So MS Swami Nathan Foundation has come out with the Pan India Fisher Friend mobile application to provide the information to the fishermen.

Mushroom farming in Hindi app is also available. So these are some of the initiatives. It is not a comprehensive list, it is only an indicative list. So

this gives us the confidence that the number of such applications are available for the purpose of farmers, especially in case of allied sectors.

Allied enterprises are part of farming system, because this crop husbandry as well as the allied enterprises are having the symbiotic relationships. Allied sectors need to be recognized as an enterprise, so that, that helps the farmers as well as he can enhance his income. The allied enterprises play the key role in changing the socio-economic conditions of primary producers, because they are into providing the regular income to the farmers. So this is in a nutshell about the e-Mediated extension initiatives for the allied sectors of agriculture.

3.4 e-EXT-NGO

Non-governmental organizations are the organizations which are having the motto of service. Which work on no profit no loss basis for the purpose of welfare of the society.

Department of Humane (DHAN) Foundation

- The foundation which was supported by the Oracle group. It is providing the ICT enabled Community Resource Centers.
- it provides services like producing and broadcasting voice sms's for the local communities.
- it supports the activity of Voice sms on livestock management. Healthy and nutritious food for women etc etc. Means for animal husbandry as well as for the women folks.
- They are organizing WhatsApp group for sharing the information on crop diseases, livestock diseases and pests. So being a non-governmental organization. So they are taking holistic care of the entire community, whether it is the womenfolk or men or the animal husbandry, crop husbandry etc.
- They are providing the support services like online consultations for health, education, agriculture, animal husbandry, fisheries and on legal issues also.
- They are developing the multimedia content in local languages for educational use and for developing software for agriculture and animal husbandry services.
- They support the community radio stations to design and deploy radio programs also. So these are some of the activities of DHAN Foundation, a non-governmental organization which was founded in 1997.

Fisher Friend mobile app

MS Swaminathan Research Foundation One of the most popular NGO that is MSSRF, which was established in 1988. They launched a Fisher Friend mobile app, basically a Decision Support System for small scale fishers. The basic idea of developing this fisher friend mobile app is reduction in risk from livelihood asset loss in the event of disaster, which are common feature, specially for the fisher folk who go deep into the sea for the purpose of fishing. Then increased income per trip. Because every trip it involves huge amount of risk. But whether they are going to get the required amount of fish or not, it is an issue. Then resource saving of fuel. Every journey incurs huge amount of resources, so that can be conserved with the help of this app. the reduced number of fishing days per trip. So these are some of the objectives of introduction of this particular app. It offers a package of scientific and relevant information in a single window platform, so that the fisher folk is the real beneficiary of this app, which is an initiative of non-governmental organization known as MS Swaminathan Research Foundation. In partnership with Oracle, they started the GIS based forewarning system on the pest attack. About 500 farmers in Tamil-Nadu were trained on pest as well as disease management practices for paddy as well as brinjal and jasmine. So it is available in the regional languages Tamil, English, Telugu, then various other Indian languages also.

Jayalakshmi Agrotech: Crop specific mobile app in regional languages, which developed more than 20 crop specific apps updated on the regular basis.

- The basic target group of this apps are the illiterate farmers
- Which are providing the content in audio-visual as well as in multiple languages
- It reminds on irrigation, fertigation, spray etc for those registered farmers
- And it provides end to end information on every crop that the farmer desires
- Then it guides to use the growth hormones, fertilizers and pesticides. The use of growth hormones by the farmers are on a very limited scale. But with the help of such app they try to develop that scientific temperament, and they can go for use of these things.
- Then information on allied sectors the goat and sheep as well as dairy farming are also available with the help of this app
- Then this particular app reminds you regarding the vaccination of

goat, sheep as well as cows.

- It provides the pricing analytics as well as the break-even analysis as far as the marketing services are considered.
- On demand weather reports are also available with the help of these apps. Digital Green Then coming to the case of Digital Green, another non-governmental organization. We had a detailed discussion on this. So far they have produced more than 5,000 videos in 50 languages. So which are spreading the information and knowledge, which are the outcomes of the efforts of the grassroots innovators.

The AFC India Ltd which was established in 1968. They have customized the farmer's training and extension and online agriculture monitoring through application of information-communication technologies at block level in the State of Uttar Pradesh. The services include

- Broad based consultancies
- Agriculture and all allied sectors
- Grassroots project
- Training and capacity building
- The technical divisions which take the role in providing services include
- Agriculture and water resources
- Natural resource management
- Socio-economic changes
- Monitoring and evaluation of the projects as well as the efforts
- External consultancy

The Nandi Foundation

They have created a Facebook page, from where the information related to the Araku coffee is being posted. Then farmers are really exchanging their informations related to the marketing of this Araku coffee. They started selling their coffee through online auction. And they are receiving 3 times more than before because of this, being part of this Facebook page for the purpose of selling of Araku. More than 45,000 farmers are the beneficiaries of this particular Facebook page, and their involvement into the marketing of their Araku coffee.

Community Radio Stations of ISAP

It is an effective tool for communication and create platform to share experiences, perspectives, innovations. To increase the yields and reduce the labour so basically this Indian Agriculture Professionals (IAP) on Facebook are also present. So there are more than 2, 30,000 memberships is there on this Facebook page. So basically to exchange the information on various issues related to agriculture.

3.5 e-EXT-Private Sector

ITC e-Choupal

It is one of the very popular and mostly discussed initiative of ITC, which is into agriculture sector. ITC is having the agro-based products like the biscuits, atta and so many products in the market. They need huge quantity of raw material like wheat, then soyabean and number of such products. just for procurement and to maintain the quality, they started the concept of choupal, wherein they are providing e-Mediated extension services totally free of cost. At the same time they are providing inputs also to the farmers for cultivation purpose, and they are having the mechanism of buying back the product any marketing services. These services are being provided to the farmers in the form of a package. So that is how the e-Choupal emerged as one of the most successful exercise in the States of Uttar Pradesh, Madhya Pradesh and in the State of Karnataka for coffee marketing. Like that they are expanding now the various things.

Tata Kissan Kendra

It is providing agro-input services including the seeds, pesticides, fertilizers at the affordable prices to the farmers. In addition to that they are providing the farm equipments and their leasing, then agronomic services, the bulk blending, training as well as information and so in case of agriculture as well as in allied sectors also they are providing the information. They provide sms to the farmers on various issues. So this is about the Tata Kissan Kendra Hariyali Kissan Bazaaris an institution that is promoted by DCM Shriram Consolidated Ltd, which provides the services related to the agricultural inputs. They provide all the agricultural inputs for the farmer such as the seeds, fertilizer, then the pesticides etc. The financial services are also being provided by this DCM Shriram. Access to the credit, then insurance, then various banking services to the farmers. The market linkages are also being provided to the farmers in the form of maybe the buyers or the sellers etc. Warehousing as well as commodity exchange services are also there. They send the messages to the farmers on the cultivation, marketing, processing etc aspect.

Skymet

The Skymet Weather is a private organization which is meant for the weather forecasting. They offer accurate weather predictions and release the related data frequently and the faster rate. Skymet also provides agro-advisory and crop statistics along with the customized weather forecast. Based on the weather forecast what are the precautions to be taken, and what are its implications on various other agricultural operations.

AgriApp

AgriApp has been launched with a motto to connect the agricultural ecosystem with the digital world. While enabling and equipping the farmers with the next generation farming techniques like "Making each farmer a digitally enabled Agricultural entrepreneur" The services offered under AgriApp include the bio-fertilizers, fertilizers, fungicides, seeds; all the inputs that we can say. So this is how the farmers are getting the benefits of this app. Then coming to IFFCO Kissan App. SoIFFCO services include a huge range of services that are being offered by this IFFCO Kissan app.

1. In addition to the free voice messages
2. Then the dedicated helpline for query resolution by the experts
3. Call back facility to listen to the voice messages
4. Then mobile quizzes and phone-in programs
5. Then focused services for groups with common interest are some of the services that are being offered by the IFFCO

Agri Media Video App

As the title is itself self-explanatory. It is an online marketing place bringing farmers, agricultural input-output as well as the farming retail as well as the fulfilment services on this online platform. It provides chat services for the farmers to solve their query related to agriculture with the option of uploading the images of the infected crops, so that the experts can revert back with a solution. Farmers can easily chat with agricultural experts and discuss their problems, so that they can have the online solutions for the problems what they are facing at their individual level. It provides videos related to agricultural practices, new technologies, successful farmers, the success stories, then the rural development, agricultural news etc. So as on date more than 10,000 farmers are the beneficiaries of these efforts.

AgroStar Agri-Doctor

It is an initiative of ULink Agritech Pvt Ltd. It is India's foremost agritech

startup working on the mission of helping farmers to win by providing complete range of agri solutions at their fingertips. Technology platform provides a combination of agronomy advice coupled with service and agri input products that enable the farmer to significantly improve their productivity and income. Currently operates in the States of Gujarat, Maharashtra and Rajasthan. More than 5 lakh farmers are the beneficiaries of this AgroStar Agri-Doctor.

Kisan Yojana (Kisan Yojana android apps)

It provides the information about all government schemes to the Kisan. So the major problem with the farming community is, as on date there are more than 140 schemes (8:01) related to agriculture that are implemented by the Union Government. But if we ask even the expert, so how many of the programs that they can count. So that number may go up to 5, 10, 15, 20. But beyond that it is very difficult to recall the names of various schemes that are launched by the government. It commutes the information gap between the rural people and the govt. So even the people living in the rural areas are the real beneficiaries of this. It also provides the schemes of the State Govt in addition to the Union Govt. This mobile application also saves the time and travel expenses of the beneficiaries. As on date more than 50,000 farmers are the beneficiaries of this App.

KrishiWorld.com

It is a private blog to educate the farmer with the latest agro information and to use new techniques to solve the inflexible farming problems. So once you enter into this thing. So that a knowledge repository is there, so that you can be a beneficiary of that.

Farm Bee

It is an app with less memory and easy user interface. It is available in 10 different Indian languages. The language barrier is broken here. It provides information at every stage of the crop life cycle. the farmer can choose more than 450 crop varieties and more than 1,300 markets and 3,500 weather locations. It also provides the Mandi price and the weather forecast. So this is what is the information what the farmers want primarily. Their marketing related information and their farm based providing. About 0.5 million farmers are using this app.

AkashGanga

Shri Kamadhenu Electronics Pvt Ltd (India) is providing this service of AkashGanga in case of dairy sector since 1996. It offers integrated solutions

for Automated Milk Collection Centres. So the milk producers as well as the cooperative societies are the real beneficiaries of this. More than 8750 automated milk collection centres are getting the benefits of this. The quality based payment system for the milk producers is the application that it is providing. So that it is acting as a ready reckoner for calculating the price of the milk and farmers are getting the benefits of that.

MyAgriGuru app

It helps farmers to know and understand their crop in a more comprehensive manner. The farmers can send crop images to MyAgriGuru for a speedy resolution by the agricultural experts, who are sitting at the other end looking into these photographs. They can analyse and they can send the solutions. The success stories, the latest technologies and best practices related to the crop are uploaded on this app, so that farmers can get motivation and they can learn from the experiences of other farmers. The weather condition and market prices are also being provided with the help of this app.

AGRIWATCH.com

It is a customized agri commodities research based organization. It has a network of more than 5 lakh farmers and 25,000 traders. This number itself gives us the volume of the business that these people are, these organizations are doing. The number of beneficiaries that we can think of. It is providing the services which include

1. The value chain studies
2. Sub-sector studies
3. The consumption studies
4. The crop surveys which are very important for the farmer

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