Chapter – IX

ICT led Knowledge Management in KVKs

9.1 ICT and Indian Agriculture

Indian Agriculture contributes 22% of our GDP, and approximately 60% Indians derive their livelihood from the agricultural sector. Today's farmers want not only the two-time bread for their families from their hard sweat, but also surplus food production, which can be sold in the market to get sufficient money to fulfill their other daily needs. Also, private sector initiatives like contract farming have commercialized the Indian agricultural sector. It has also seen many new concepts and theories substituting the traditional methods. Introduction of Information and Communication Technology (ICT) is one of them, which enables the dissemination of requisite information at the right time. This revolution in information technology has made access to the information easy and cost-effective.

9.2 ICT: A definition

ICT is an integration of the technologies and the processes to distribute and communicate the desired information to the target audience and making the target audience more participative in nature.

9.3 Need of ICT in Indian Agriculture

At present, the ratio of the farmers to the extension worker is 1000:1, which is really very less. Although the appointed Village Local Workers (VLWs) disseminate the information, they hardly accept any accountability. These two issues have created the urgency to help and guide the poor farmers properly. The cost factor in face-to-face information dissemination at the right time, and the difficulties in reaching the target audiences, has also created the urgency to introduce ICT. It is only by the introduction of ICT that information can also be upgraded at the least cost. There are several models of ICTs in Indian agriculture, which have made a significant difference in the delivery of services in Indian agriculture like, the establishments of Kisan Call Centers, Gyandoot project, Bhoomi project, Village Knowledge Centers, and AGMARKNET. These examples are discussed in detail later in this chapter.

9.4 Knowledge Management – A general overview

Knowledge Management (KM) comprises a range of practices used in an organization to identify, create, represent, distribute and enable adoption of insights and experiences. Such insights and experiences comprise knowledge, either embodied in individuals or embedded in organizational processes or practice. An established discipline since 1995, Knowledge Management initially included courses taught in the fields of business administration, information systems, management, and library and information sciences only. More recently, other fields, to include those focused on information and media, computer science, public health, and public policy, also have started

contributing to KM research. Knowledge Management in agriculture is still in an evolving stage while the amount of knowledge available in agriculture related organisations is enormous when compared to the above mentioned fields. Many large companies and non-profit organisations have resources dedicated to internal KM efforts, often as a part of their 'Business Strategy', 'Information Technology', or 'Human Resource Management' departments. Several consulting companies also exist that provide strategy and advice regarding KM to these organisations. In a public organization like KVK, the scientists themselves have to take initiative towards Knowledge Management efforts.

KM efforts typically focus on organizational objectives such as improved performance, competitive advantage, innovation, the sharing of lessons learned, and continuous improvement of the organization. KM efforts overlap with Organizational Learning, and may be distinguished from by a greater focus on the management of knowledge as a strategic asset and a focus on encouraging the exchange of knowledge. KM efforts can help individuals and groups to share valuable organizational insights, to reduce redundant work, to avoid reinventing the wheel per se, to reduce training time for new employees, to retain intellectual capital as employees turnover in an organization, and to adapt to changing environments and markets.

9.5 History and research

KM efforts have a long history, to include on-the-job discussions, formal apprenticeship, discussion forums, corporate libraries, professional training and mentoring programs. More recently, with increased use of computers in the second half of the 20th century, specific adaptations of technologies such as knowledge bases, expert systems, knowledge repositories, group decision support systems, and computer supported cooperative work have been introduced to further enhance the such efforts. A broad range of thoughts on the KM discipline exists with no unanimous agreement; approaches vary by author and school. As the discipline matures, academic debates have increased regarding both the theory and practice of KM, to include the following perspectives:

- **Techno-centric** with a focus on technology, ideally those that enhance knowledge sharing and creation
- **Organizational** with a focus on how an organization can be designed to facilitate knowledge processes best and
- **Ecological** with a focus on the interaction of people, identity, knowledge, and environmental factors as a complex adaptive system akin to a natural ecosystem.

Regardless of the school of thought, core components of KM include People, Processes, Technology (or) Culture, Structure and Technology, depending on the specific perspective. Different KM schools of thought include various lenses through which KM can be viewed and explained, to include:

- Community Of Practice
- Social Network Analysis
- Intellectual Capital
- Information Theory
- Complexity Science
- Constructivism

9.6 Dimensions of Knowledge

Different frameworks for distinguishing between knowledge exist. One proposed framework for categorizing the dimensions of knowledge distinguishes between *tacit knowledge* and *explicit knowledge*. Tacit knowledge represents internalized knowledge that an individual may not be consciously aware of how he or she accomplishes particular tasks. At the opposite end of the spectrum, explicit knowledge represents knowledge that the individual holds consciously in mental focus, in a form that can easily be communicated to others.

Early research suggested that a successful KM effort needs to convert internalized tacit knowledge into explicit knowledge in order to share it, but the same effort must also permit individuals to internalize and make personally meaningful any codified knowledge retrieved from the KM effort. Subsequent research into KM suggested that a distinction between tacit knowledge and explicit knowledge represented an oversimplification and that the notion of explicit knowledge is self-contradictory. Specifically, for knowledge to be made explicit, it must be translated into information (i.e., symbols outside of our heads).

A second proposed framework for categorizing the dimensions of knowledge distinguishes between embedded knowledge of a system outside of a human individual (e.g., an information system may have knowledge embedded into its design) and embodied knowledge representing a learned capability of a human body's nervous and endocrine systems.

A third proposed framework for categorizing the dimensions of knowledge distinguishes between the exploratory creation of "new knowledge" (i.e., innovation) vs. the transfer or exploitation of "established knowledge" within a group, organization, or community. Collaborative environments such as communities of practice or the use of social computing tools can be used for both knowledge creation and transfer.

9.7 Strategies for Knowledge Management

Knowledge may be accessed at three stages: before, during, or after Knowledge Management related activities. Different organisations have tried various knowledge capture incentives, including making content submission mandatory and incorporating rewards into performance measurement plans. Considerable controversy exists over whether incentives work or not in this field and no consensus has emerged.

One strategy to KM involves actively managing knowledge. In such an instance, KVK personnel can strive to explicitly encode their knowledge into a shared knowledge repository, such as a database, as well as retrieving knowledge they need that other persons have provided to the repository. The development of a database and sharing it through a dedicated website comes into picture here. Another strategy to KM involves individuals making knowledge requests of experts associated with a particular subject on an ad hoc basis. In such an instance, expert individual(s) can provide their insights to the particular person or people needing this.

9.8 Data Mining

Humans have been “manually” extracting information from data for centuries, but the increasing volumes of data in modern times has called for more automatic approaches. As data sets and the information extracted from them have grown in size and complexity, direct hands-on data analysis has increasingly been supplemented and augmented with indirect, automatic data processing using more complex and sophisticated tools, methods and models. The proliferation, ubiquity and increasing power of computer technology has aided data collection, processing, management and storage. However, the captured data needs to be converted into information and knowledge to become useful. Data mining is the process of using computing power to apply methodologies, including new techniques for knowledge discovery, to data.

Data mining identifies trends within data that go beyond simple data analysis. Through the use of sophisticated algorithms, non-statistician users have the opportunity to identify key attributes of processes and target opportunities. However, abdicating control and understanding of processes from statisticians to poorly informed or uninformed users can result in false-positives, no useful results, and worst of all, results that are misleading and/or misinterpreted.

Although data mining is a relatively new term, the technology is not. For many years, businesses and governments have used increasingly powerful computers to sift through volumes of data such as airline passenger trip records, census data and supermarket scanner data to produce market research reports. (Note, however, that reporting is not always considered to be data mining). Continuous innovations in computer processing power, disk storage, data capture technology, algorithms, methodologies and analysis software have dramatically increased the accuracy and usefulness of the extracted information.

The term data mining is often used to apply to the two separate processes of knowledge i.e. discovery and prediction. Knowledge discovery provides explicit information about the characteristics of the collected data, using a number of techniques (e.g., association rule mining). Forecasting and predictive modeling provide predictions of future events, and the processes may range from the transparent (e.g., rule-based approaches) through to the opaque (e.g., neural networks).

Data mining is the process of extracting hidden patterns from data. As more data is gathered, with the amount of available data doubling every three years, data mining is becoming an increasingly important tool to transform this data into information. It is commonly used in a wide range of profiling practices, such as marketing, fraud detection and scientific discovery. KVKs can apply Data mining to data sets of any size for producing useful new knowledge for further innovations.

9.9 Knowledge Discovery in Databases (KDD)

The most well-known branch of data mining is Knowledge Discovery, also known as Knowledge Discovery in Databases (KDD). Just as many other forms of knowledge discovery it creates abstractions of the input data. The knowledge obtained through the process may become additional data that can be used for further usage and discovery.

Knowledge discovery is a concept that describes the process of automatically searching large volumes of data for patterns that can be considered knowledge about the data. It is often described as deriving knowledge from the input data. This complex topic can be categorized according to 1) what kind of data is searched; and 2) in what form is the result of the search represented.

Once KVKs set up their own dynamic databases and make it available to all in the form of websites, the next step can be on KDD. This creates additional data that can be used for further usage and technological innovations. At the zonal level, Zonal Project Directorates maintain their own databases and websites which KVKs can utilize. For example, the Zonal Project Directorate, Zone – III, maintains a fully updated website which is available at www.icarzcu3.gov.in

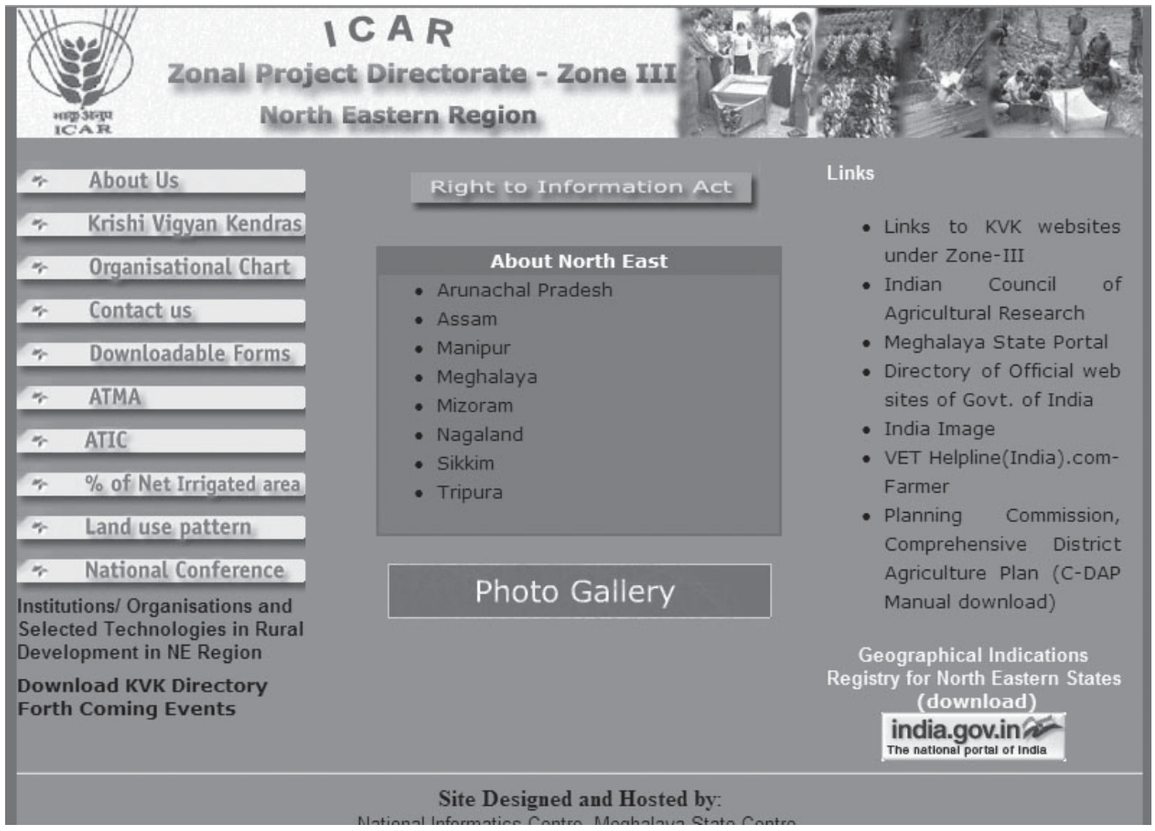


Fig: Home page of www.icarzcu3.gov.in

9.10 Cyber extension

Cyber extension refers to the process of extension done over cyber space. Cyber space refers to the virtual space of interconnected networks over the globe which provides connectivity round the clock. Information and communication technologies commonly referred to as ICTs make this possible over the cyber space. In recent years cyber extension has gained popularity and we have numerous successful cyber extension initiatives under public and private domain in India.

The most important role of ICT in development is fostering a knowledge intensive sustainable livelihood security system in rural areas, since ICT can enable us to reach the unreached and include the excluded information, knowledge and skill empowerment. Any inclusive knowledge society requires the effective harnessing of ICTs to combat poverty and foster development. The issues of importance for KVKs are:

1. Access
2. Content and
3. Capacity Building

9.10.1 Access to information and knowledge for all

Access to information and knowledge is impeded for much of our population due to poverty, illiteracy and isolation. Linkages among professional partners is essential to reach those who are unreached by ICT and especially those who are under the greatest risk of being left out of the knowledge societies (rural population, urban poor, illiterate and marginalized).

9.10.2 Content

Promotion of free exchange of knowledge has never been more relevant. KVKs have to promote diversity of content in their media and information networks. For this, use of ICTs is a must. ICTs increase access to information and knowledge from a rich variety of sources. As information streams become more globalised, it is imperative that the means exist to share technology and skills. E – Connectivity initiatives aim to ensure knowledge diversity and genuine pluralism through local content production in every KVK. It is a must to ensure a strong public domain of information, readily accessible to all in the KVK and outside.

9.10.3 Capacity building

Capacity building in KVK knowledge management requires a continuous process of reinforcing media, libraries and other institutions, of improving the knowledge and skills of KVK professionals as well as the general information and awareness of farmers. Training, continuing education and life long learning for extension/ media and information specialists are also essential. Special effort is needed in the area of media and information literacy, especially for farm women and rural youth.

9.11 Dynamics of ICTs: *The 8 Cs*

The dynamics of ICTs can be well summed up to the 8 Cs. They are:

Parameters	Attributes
1. Connectivity	How affordable and widespread are ICTs (Eg. PCs, internet access, software etc) for rural citizens?What technologies are emerging and appropriate?

Parameters	Attributes
2. Content	Is there useful content (local or global) for rural citizens to use in their daily lives? Can rural citizens access and create relevant content?Does the content meet the educational and other needs of farmers?
3. Community	Are there online/offline forums where rural citizens can discuss ICTs, community radio, applications and relevant issues of concern?Will decision makers take part in such forums?
4. Commerce	Is there infrastructure for e-commerce for citizen, businesses and government? How much commerce is transacted electronically?What hybrid means of fulfilling transaction can be leveraged for Govt. to Citizen (G2C), Business to citizen (B2C), lab to land (L2L) and Business to Business (B2B) commerce?
5. Capacity	Do rural citizens/organization have human resources (technical/legal/ managerial/ policy) to effectively harness digital tools for daily use?Is there adequate organizational capacity as well? Can content/community activities be converted into knowledge assets?
6. Culture	Is there a forward looking, often progressive culture at the level of policy makers, businesses, educators, citizens and the media in opening up rural areas to ICTs and harnessing them?OR is there nervousness, phobia and lethargy about ICT impacts?
7. Cooperation	Is there adequate cooperation between citizens, businesses, academics, NGOs and policy makers to create a favourable climate for using ICTs in rural areas?Can this cooperation extended to policy initiatives at national level?
8. Capital	Are there enough financial resources to invest in ICT for development in rural area?What kind of financial and social reforms can be expected from rural ICT for development?What kind of knowledge goods & capital can emerge from ICT?

KVKs should also note that while trying to establish and develop an online knowledge centre, the following phases are normally seen. The growth path can be summarized as below:

Phase	Characteristics
1. Basic	Basic computer access, surfing net & downloading forms.
2. Interactive	E mail, customization of forms.
3. Publishing	Creating web sites, pages, intranet, CD ROMS
4. Trans-active	E commerce, job creation and marketing
5. Knowledge enabled	Digesting/ localizing knowledge assets, creating local knowledge assets
6. Integrative	ICTs, radio and traditional media
7. Knowledge capitalizing	Leveraging intellectual capital for financial returns, gain.
8. Globalizing	Exporting model/ IP to other parts of world
9. Transformative	Radical restructuring of rural economy, networks

9.12 India's Position in Use of ICTs

India is positioned as the highest English speaking population in Asia with the highest number of Information Kiosks implemented across rural sectors. 45 per cent of the worlds' ICT projects are implemented in India. India also has a proposal for Rural Info Kiosk project where in one Rural Info Kiosk in each of the 600,000 villages will be established.

9.13 Unique Features of Successful ICT Projects in our country

- The "Bhoomi" project (digitalized land records) in Karnataka today serves as an excellent example of governance in its ideal form, transparent and accountable.
- e-Shringula, a one-stop, Web-enabled portal for information and services relating to the government-citizen interface creating an "e-Shringula" ("electronic chain") of information and e-governance.
- 'Drishtee' besides providing technical expertise and management consultancy to build the IT infrastructure and the human capacity to link service providers (government department and private firms) with rural citizens.
- 'Info-Village' of Puducherry by MSSRF developed community ownership and collective action with a "pro-poor", "pro-nature" and "pro-women" approach to development.
- In Gyan Ganga project, Gujarat all comprehensive education, support and services including agriculture and veterinary services were provided.

- 'e-Choupal' is a huge private sector investment by ICT, which revolutionized agricultural commodity marketing in India procuring Soya, Coffee, and Prawns at the doorsteps of the villagers and provides all real time data on crop prices, products and services and facilitate supply of high quality farm inputs in partnership mode.
- ICT devices into the management of operations of the National Dairy Development Board and their milk collection centres in Gujarat and the Swayam Krishi Sangram (SKS) smart cards project use of ICT to reduce transaction costs and reduce the cost of credit are other two successful examples of commercial ventures of ICT in India.
- Info knowledge Village at Puducherry, Warna Wired Village project in Maharashtra, Krishi Vigyan Kendras of ICAR at Ahmednagar and Baramati provided quality offline, static content including packages of practices, recommendations, locally relevant technologies, government schemes, FAQ etc. in local languages.
- Women empowerment through SEWA in Gujarat, mobile classrooms through IT buses in rural Pune, Project Shiksha – computer literacy, Action Aid at Bolangir, Orissa, Akshaya at Malappuram, Kerala, and EDUSAT address the issue of capacity building and empowerment of farmers, farm women, rural artisans and also large number of extension personnel and use of ICT for education and alleviation of poverty from rural sector.
- SATCOM, Madhya Pradesh, Teja TV in Andhra Pradesh and E-TV telecasted programmes on location specific agricultural technologies integrated and Interactive live question answer sessions in local languages resulting in high percentage of farmer-viewers.

9.14 Scalability of ICT projects

The scalability of ICT projects in India depends on the following factors:

- The value addition in the services for farmers
- Appropriate management model
- Government role in supportive policy environment
- Institutionalizing the public-private-community partnership model at the grass root level
- Appropriate and affordable technologies that can be adopted by the end users, and
- Increase in functional literacy level of farmers

9.15 Recent ICAR-ICT Efforts

ICAR has established IP-Telephony and Video Conferencing at 23 ICAR Institutes with Head Quarters. VSAT Connectivity is provided to 200 KVKs through ERNET, KVK and ICAR Network. Upgradation of ICAR-ERNET network involving all ICAR Institutes and SAUs is on-going under NAIP Project Component.

9.16 ICAR-ICT efforts for KVKs: The future strategy

ICAR has to focus on development of situation specific (district wise) virtual repository of information thus taking farmers technological contributions on a world/ national platform. Sharing

farmers' experiences from region to region through internet/intranet, online availability of advisory services and integration of PC and mobile services also has to be initiated in all the KVKs. This can be achieved through development of situation specific content/ information, ensuring satisfactory connectivity, adequate training to all SMS, developing static multimedia content, developing ethics, codes and standards for content hosting, registering exclusive common domain and web space for KVKs for web hosting.

9.17 Accessibility of e-information in Indian Languages

Accessibility of e-information in various regional languages is also important. Chennai based Lastech Systems Private Ltd has launched e-mail Software called 'Indomail' in 12 Indian languages. Indian Operating System called Bharatbhasha for use in computers in Indian and South Asian languages is also developed. Bharatbhasha gives freeware fonts in Bangla, Hindi, Marathi, Gujarati and Gurmukhi. Other Indian language software products include 'Lingua Indica' and 'SRD Akruti' of Bangalore, 'Cirrus Software' of C-DAC, Modular Systems and Seacom of Pune.

9.18 ICT and Livelihood Security

The most important role of ICT in development is fostering a knowledge intensive sustainable livelihood security system in rural areas. Since ICT can enable us to reach the unreached and include the excluded information, knowledge and skill empowerment, communication and information hold the key to development in the 21st century. An inclusive knowledge society requires the effective harnessing of ICTs to combat poverty and foster development.

9.19 Examples of successful Public Private Partnerships

At a state wide level, project Akshaya has brought together a state player (Kerala Govt.) and private sector player (TULIP IT services) to create an internet backbone network for the state, which can be used as a platform to launch a number of infrastructure initiatives. Financial institutions play a key partnering and nurturing role for knowledge centers. Successful examples include NABARD's e-governance services in Himachal Pradesh and SBI's rural information kiosks in Tamil Nadu. Information communication centre initiatives and knowledge centre. Successful examples by cooperatives include rural automation, smart card, AMCs and ERP (Enterprise Resource Planning) implementation by Vijaya Dairy, Vijayawada. DISK (Dairy Information & Services Kiosks) a Decision support system developed by them provides database, internet connectivity, dairy cooperative society accounts management system, ID code/ smart card for dairy farmers, disk database that contains breed and history of disease, artificial Insemination and pregnancy, data on milk production by individual farmers and forecasting of milk collection and provide feed back to farmers.

9.20 Other highly successful Cases from India

9.20.1 I-Kisan (I kisan portal & I kisan information kiosks)

I-kisan portal (**www.i_kisan.com**) is developed by Nagarjuna fertilizers. The portal provides agriculture information about 20 crops, online chatting with experts, market information with respect to products & services of Nagarjuna group, weather forecasting, current events in agriculture and

directory of input and output suppliers. I – kisan information kiosks presently operates in Andhra Pradesh and Tamilnadu. It provides a CDROM database which covers the topics of crop disease and pest management, soil and water management, agricultural equipments, agricultural inputs, market information, animal husbandry and insurance and policy information.

9.20.2 E – Choupal

This was started by international business division of ITC Ltd in June 2000. Six states namely AP, Karnataka, MP, Maharashtra, Rajasthan and UP are under this and its popular in Madhya Pradesh with 900 kiosks. E – Choupal is having distinct websites (portals), through which farmers can get required information on various crops. The portal details are given below:

www.echoupal. com	Wheat, Pulses, Rice	Hindi	UP, MP, Rajasthan
www.soyachoupal.com	Soyabean	Hindi, Marathi	MP, UP, Rajasthan, Maharashtra.
www.plantersnet. com	Coffee	English, Kannada	Karnataka.
www.aquachoupal.com	Shrimp	Telugu	Andhra Pradesh.

9.20.3 Information Village and Village Knowledge Centers (VKCs)

Village knowledge centers of MS Swaminathan research foundation were launched in 1998 in Puducherry. The main aim behind the establishment of VKCs was to provide sustainable food security in rural areas of Puducherry. To fulfill this aim, it provides technical information related to agricultural inputs. It helps in procuring quality seeds, in providing information about the daily market price from the government as well as private bodies, and advices farmers on rotation of crops as well as about the use of fertilizers and pesticides. VKCs receive information by voice mail, and disseminate it through any public address system. It has also identified 13 districts in Pondichery, where there is a huge potential for agriculture business, and where the government will invest Rs. 170 cr.

9.20.4 Warana Wired Village (WWV) Project

Warana Wired Village Project was launched in 1998 as a collaboration of NIC, Govt. of Maharashtra with collaborative attempt of Warana Vibhag Shikshan Mandal (WSM), Education Department and Warana Group of Cooperatives. The project aims to provide information about agriculture, market and education to 70 villages around Warana Nagar. Information dissemination is by web based and intranet based model. The project has developed a GIS based map of 70 villages.

9.20.5 The Gyandoot Project

The Gyandoot project was started in the Dhar district of Madhya Pradesh, which covers five lakh people of 311 gram Panchayats, 600 villages and 26 Soochnalayas. Soochnalayas are nothing but information centers at the village level set up by the Government of India in collaboration with local bodies. This center is operated by unemployed rural youth (Soochaks), who is thereafter trained.

A committee called Gyandoot samiti manages it. The district collector is the president of this soochnalayas, and the sarpanch of district panchayat acts as the secretary of the committee. The service covers to provide information about the agricultural produce, auction center rates, copies of land records, on-line registration of applications, village auction sites and more. The Village Auction Site project was started in June 2002, which allows farmers and villagers to advertise and sell land, agricultural machinery, equipment, and other durable commodities. Minimum user fees are charged by the information centers to provide information. Likewise, information about a commodity on sale is provided for a charge of Rs. 25 for three months, and Rs. 10 is taken for finding the list of salable commodities.

9.20.6 Kisan Call Centers (KCCs)

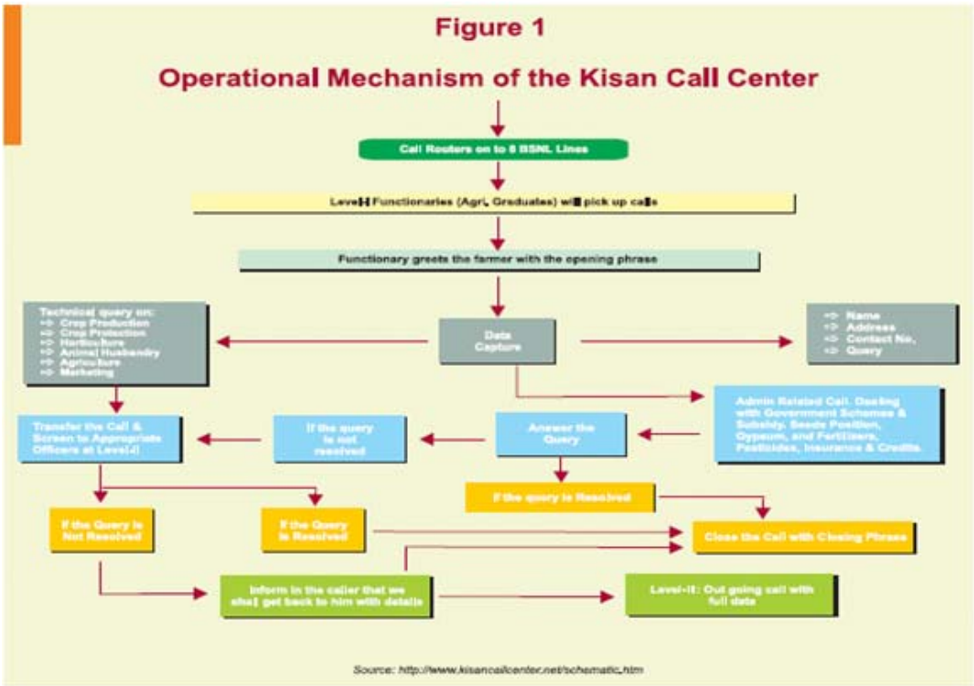
KCCs were launched on January 21, 2004 by the Department of Agriculture and Co-operation. The main technologies involved in Kisan call centers are:

- Desktop computer system with Internet connectivity.
- High bandwidth telephone line (preferably 128 kbps ISDN line).
- Telephones with headphones and teleconferencing facility (if required).

The main aim is to deliver the extension services to the farming community in the local languages. The farmer dials the help line, a toll free number, 1551, and the agricultural graduates provide the initial enquiry. If the queries handled by the agriculture graduates are not satisfactory to the farmers or the farmers want more information, the call is forwarded to level II and level III executives. (See Figure I)

Figure 1

Operational Mechanism of the Kisan Call Center



Source: http://www.kisancallcenter.net/schematic.htm

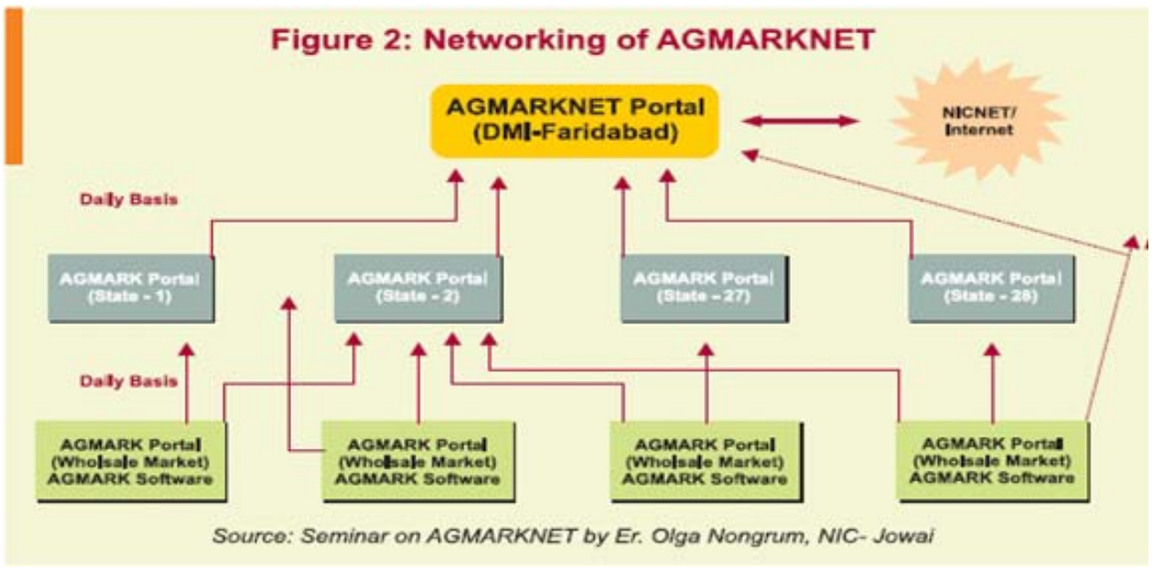
Thus, KCCs are the important information gateway for farmers. The cost to the farmers is almost zero, and they get the response in their local languages. If needed, the agricultural scientists also visit the field to resolve any further queries.

9.20.7 Bhoomi Project

This project includes the computerized land records throughout Karnataka State. For the same, a farmer can now walk into any of the taluk offices and ask for a printout of his computerized land record for a mere Rs. 15 from the land records booth. This computerized land record facilitates the farmers in obtaining, so-called technically, the Rights, Tenancy and Cultivation (RTCs) certificates. RTCs are important as they ensure land ownership, and help farmers in getting bank loans, for which most banks seek some security. Moreover, the Bhoomi project also provides online connectivity to various courts to make use of the land records database to settle civil disputes on land ownership and cultivation.

9.20.8 AGMARKNET

AGMARKNET, (Agricultural Marketing Information Network), is a joint venture of the Directorate of Marketing and Inspection (DMI) and the National Informatics Center (NIC). DMI and NIC are the sponsoring agency of AGMARKNET. It has increased the efficiency in marketing activities by establishing a nation-wide information network, which provides details about market functionaries, sold and unsold stocks, as well as the sources of supply and destination. These timely information data are helpful to producers, traders and consumers. AGMARKNET has been connected to 670 agricultural produce markets and 40 State Agricultural Marketing Boards & Directorates. Each AGMARK portal of wholesale market provides daily information to AGMARK portals of its respective states, and then each state's AGMARK portal sends the information to the AGMARKNET portal. All these software are maintained by the National Information System (See Figure 2).



APEDA (Agricultural and Processed Food Products Export Development Authority), NAFED (National Agricultural Co-operative Marketing Federation of India Ltd), Food Corporation of India, Central Warehousing, SFAC (Small Farmers Agri-Business Consortium) are the main users of the AGMARKNET portal. The food processing units, traders and different village kiosks, to help the farmers in taking the right decisions, mainly use these portals[1].

9.21 Millennium Development goals

We will spare no effort to free our fellow men, women and children from the abject and dehumanizing conditions of extreme poverty, to which a more than a billion of them are currently subjected'

- Declaration by UN, Sept, 2000 maiden year of the new millennium

Millennium declaration was adopted by 189 world leaders in September, 2000 to free all men, women and children from the abject and dehumanizing conditions of extreme poverty by 2015. For the purpose, eight millennium development goals (MDGs) were set up to cope with a variety of issues such as promotion of education, maternity, health care, gender equality, poverty reduction policies, child mortality, AIDS and other fatal diseases. MDGs were set for the year 2015 with reference to the international situation prevalent in 1990.

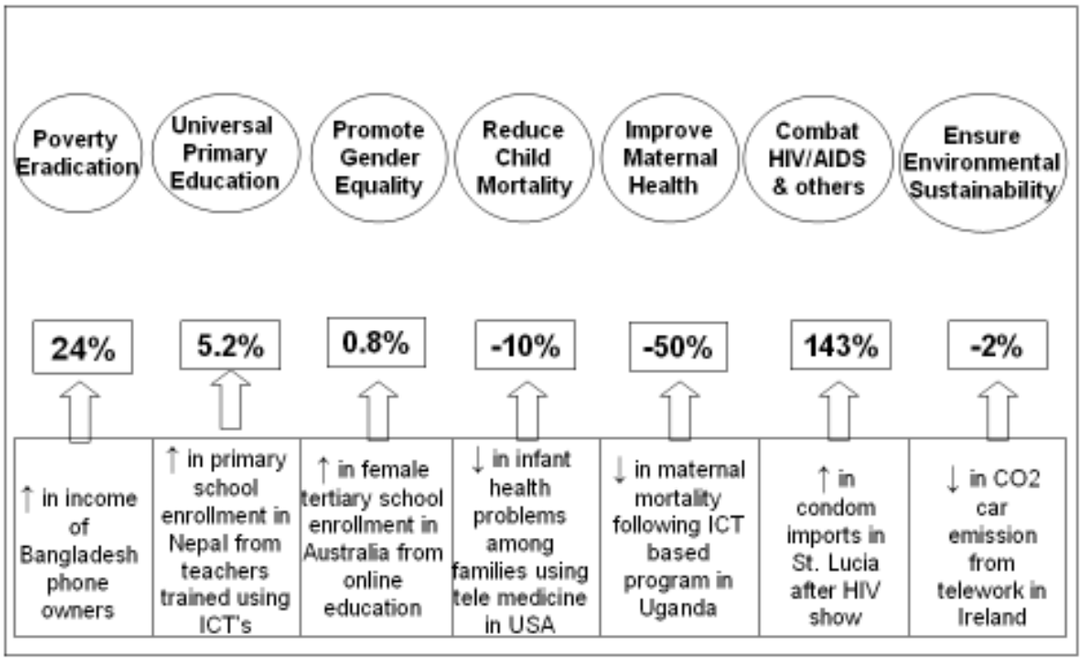
Eight objectives/ goals are;

1. Eradicate extreme poverty & hunger
2. Achieve universal primary education
3. Promote gender equality & empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/ AIDS, malaria and other disease
7. Ensure environmental sustainability and
8. Develop a global partnership for development.

[1] ***Refer Associated Review V (Chapter XII) for articles on Experience of TNAU, Coimbatore in ICT led Knowledge Management***

Impact of ICT's on the MDG's

Percentage of change in different MDG indicator caused by ICT-based actions.

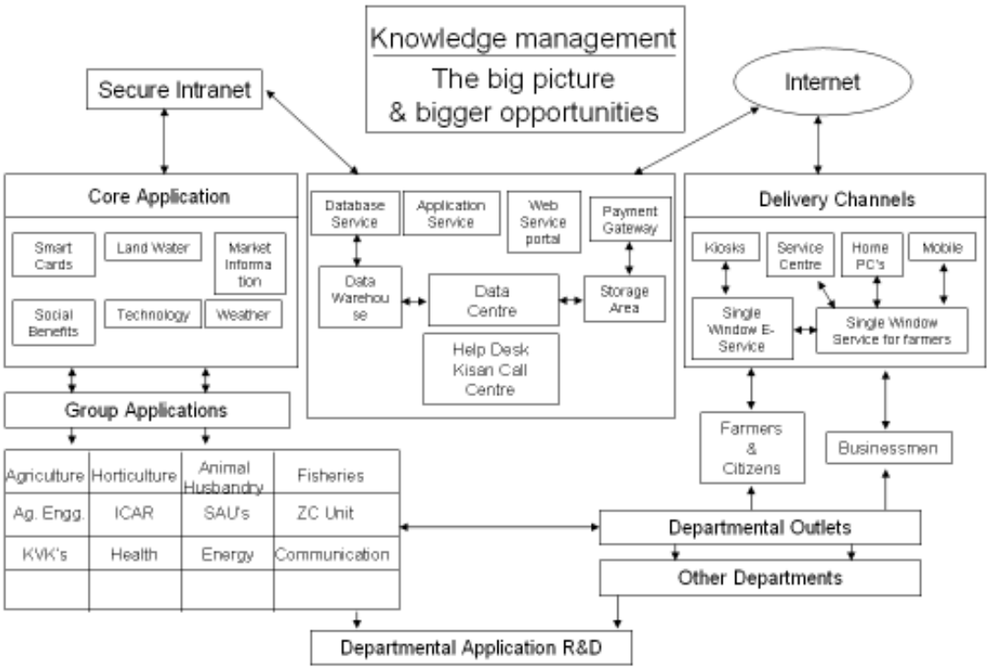


Role of ICT in eradicating extreme poverty and hunger

- Increase access to market information and lower transaction costs for poor farmers and traders
- Increase efficiency, competitiveness and market access
- Enhance the technology availability and accessibility to the farmers
- Information on monsoon, money and market
- Use of remote sensing technologies
- Effective monitoring, resource management and mitigation of environmental risks
- Increase access to/ awareness of sustainable technologies, waste land management
- Facilitates knowledge exchange and networking
- Online database and
- Promotion of digital literacy through 'e learning'.

9.22 Kiosks

Kiosks are a computer terminal or touch screen displays that runs customized software which serves the functions for which it is programmed to, while, at the same time, preventing users from accessing system functions. ICTs such as email, www and computer kiosk promise to provide innovative solutions to the problems of poverty and inequality by accelerating development introducing transparency to the systems and operations.



Kiosks are accepted due to the availability of content in local languages or multilingual platforms. They provide easy access of timely and accurate information without wasting time and money.

Content preparation for Kiosks involve identification of information needs from various stakeholders, prioritization of needs using statistical analysis, construction of information base using technical books, expert opinion, internet, journal etc and content development in the required format.

Kiosk Hardware

The Kiosk hardware has a cabinet containing a central processing unit, a display screen, and peripherals like printer, scanner etc and additional signage area. Connectivity can be through dialup, VSAT, leased lines, ISDN lines, braodband, Wi-Fi, wireless loop (WLL) and peripherals consisting of web chambers, video conferencing unit and audio conferencing unit.

Kiosk software

Kiosk software consists of the following:

1. Operating system: Novell NetWare, Windows NT, Windows 2000, Sun Solaris, IBM OS/2, CISCO internet operating system etc.
2. Management software: Useful for security, application & management software is capable of distinguishing between those who are allowed to access and others who are forbidden.
3. Enterprise software: Dbase, GIS etc.
4. Information worker: MATLAB, D base, statistical packs, E mail etc.
5. Media development software: web development software, image editing etc.

9.23 Development of visual solutions by CDAC (GOI)

CDAC (Centre for Development of Advanced Computing) has the following objectives:

- Identify the needs and requirements of digitally impoverished communities which are to be addressed with the application of ICT
- To apply the ICT solutions specifically tailored to address the requirements identified
    - Initial focus is on internet technologies, language technologies and speech technologies
    - Sectoral areas proposed to be covered are agriculture, health care and education
- To investigate the selected ICT solutions with a view to possible adaptation, customization and/or localization as the case may be for addressing such requirements
- To pilot test the solutions developed in selected areas and critically gauge the effectiveness and impactness of these solutions.
- To establish and support mechanisms for information dissemination on ICT based developments

They also design and deliver specialized training programmes in the use of ICT solutions developed, relevance to the farming system. Solutions like virtual class room environment for extension education, health care solutions etc and SMART (Small and Medium Applications of Rural Technicalization) helps to link the developed technology with well identified end user requirements.

9.24 Development of usable content

Access to relevant information is primary contribution of ICT. Availability of such information in human readable and electronic form is important. Content needs to be in local language apart from English. This is addressed through a number of related initiatives which are discussed below.

9.25 Open Office.org office suite

Enabling need based transition of English content to desired local languages will make the vast English language content accessible to non English speakers. OpenOffice.org Office Suite is an open source office productivity tools suite across platforms that will enable the creation of documents and other content in Indian languages and will thus make relevant content available in local languages. The products include Bharateeya-OO, Matrubhasha, DAAL, SETU, ECKO, e-kamps, Vyapar and multilingual Virtual class room etc.

9.25.1 Bharateya-OO

Bharateeya-OO project is an initiative of C-DAC to bring Open Office.org to India in Indian languages. OpenOffice.org is an Open Source Project developed by sun Microsystems for the popular Star Office™ productivity suite. The objective is to enable Indian language support in all applications of the OpenOffice.org suite on Windows and Linux Platforms. Currently the product is enabled with Indian language support in Localisation (Translation of interfaces from English to Hindi and Tamil)

and Internalisation (complex text layout (editing, selection, deletion and so on), transliteration, spell checking, processing within controls). Some of the languages supported currently are Devanagari, (Hindi, Konkani, Marathi and Sanskrit) Gujarati, Gurmukhi (Punjabi), Kannada, Malayalam, Oriya, Tamil, Telegu and Bengali.

9.25.2 Matrubhasa

Matrubhasa is Unicode and MBROLA based software solution for Text to Speech synthesis (TTS) in Indian languages. It can be used by Software developers to incorporate speech capabilities (in Indian languages) into their Software thereby increasing its usability across different sections of society. TTS cover seven Indian languages- Hindi, Tamil, Kannada, Telugu, Bengali, Marathi and Gujarati and more in coming years. The tools developed under this project Matrubhasa cater to three different kind of users:

- For end users: Matrubhasa provides PRAVAKTA which is an extensive plug – in framework for office Suites and Browsers (Microsoft office, Open Office, Internet Explorer and Mozilla Browser)
- For Software developers: BHAASHANAPI is available in the major languages like Java, C, C++ and com.
- For linguists, various language and speech modeling tools like Uccharak, Bhavna and Anuvaachak which help rapid development of Speech Synthesis components.

9.25.3 DAAL – Document Access across Languages

DAAL is essential for bridging the language divide. It is a combination of two technologies:

- Cross lingual information Retrieval (CLIR) for identifying documents in a language different from the query language
- Machine translation (MT) for translating the documents to the query language.

9.25.4 SETU

SETU is one such system based on DAAL. SETU enables a person to query and retrieve documents on the internet in Hindi. This system is built on the existing search engine.

9.25.5 ECKO (Empowering Communities through Knowledge)

ECKO is a kind of Content Management Software (CMS) which focuses on building rural communities by collaborating and sharing their knowledge. It is built completely on Open Source Solutions (PHP, Apache My SQL) and runs on the Linux platform. The system is highly optimized for server performance, as it has to run in constrained environments like low band width availability. The unique feature of this system is its availability to communicate with ECKO system by various communities. Currently the system is evolving as a knowledge inferential system. This is a simple, yet powerful user interface easy to use and does not take much time to download to local machine. ECKO has been developed by C-DAC as a part of Community based Content Delivery Network (CCDN) Project.

9.25.6 E - Kamps

E - Kamps is a web based application to assist health care authorities in three major activities like:

- Plan a medical camp – Step by step activities to ensure a successful and complete execution of a medical health camp.
- Deploy the camp defined (Camp Plan) on to select health care bodies to conduct the camp on a specific time in the calendar.
- Collect the data during the Camp using customized electronics survey forms uploaded from an e-kamps application on to a 'Simputer' or any other hand held device and provide it for further port camp analysis by higher level authorities in time.

A notable tool that the e-kamps application provides is:

- A user friendly form designing tool, using which, a healthcare camp designer can design their own need based forms (details collected are different for different diseases) for collecting data during the course of the camp conduction, using any hand held device like Simputer/ PDA or using a laptop/ desktop.
- Provides this form in local languages to increase its utility.

9.25.7 Vyapar

Vyapar provides a common on-line meeting ground for villagers where they can trade and get most information about their foods, products and services. The main purpose of this product is to eliminate the middle men generally involved in any type of transactions. The people who choose to sell their items, post it in the system, which is viewed by various people residing in other villages. Interested buyers can then contact the person. The system provides facilities to the administrators, Kiosk operator, and member for various activities related to the transactions. The system has been completely developed using free software. Currently, one such system is in use in Melur, near Madurai, Tamil Nadu.

9.25.8 Multi Lingual Virtual Class Room (MULVIRC)

These are solutions that will cater to the communication needs of people in their local language. This includes two core components namely – Multilingual Communication Channel (MCC) and Virtual Classroom (VC).

9.25.9 MCC – Multilingual Communication Channel

MCC facility allows online interactive text communication such as one-to-one, one-to-many, and many-to- many users, using intuitive interface, and also includes features of file transfer, session logging, and session replay. MCC facility is very useful for online conferencing in 'e-governance' applications.

9.25.10 VC – Virtual classroom

Virtual classroom is an extension of MCC facility and provides an interactive environment suited for online teaching. It includes features such as virtual white board wherein a teacher can write

or draw figures to explain concepts, doubt raising and answering facility, storage of compiled classes and control over the classroom session. The facility will be a very useful support tool in academic environment especially in extension education, distance education and ODL. The solution is also to be integrated with text to speech systems to augment its usability.

9.26 UNESCO Programmes/ Initiatives

UNESCO has two programmes called International Program for the Development of Communication (IPDC) and Information for All Program (IFAP). IPDC assists the development of communication infrastructure, and professional training in order to reduce the gap between countries in the communication field. IFAP provides a platform for international policy discussion and guidelines for action on the preservation of information and universal access to it.

9.27 eNRICH

eNRICH is a software solution which enables community groups to built their own gateway to web and other multimedia. It is customizable and designed to work in local languages for non experts. It is a simple way to organise and animate information resources, making access earlier for local users. It is available at http://enrich.nic.in

CDS/ ISIS – IDAMS (UNESCO)

These are two interrelated software packages for data base management (CDS/ ISIS) and date mining/ statistical analysis. These are developed, maintained and disseminated free of charge by UNESCO.

9.28 Issues in ICT implementation in Indian agriculture

There are various issues of importance which has to be considered for successful implementation of ICT in Indian agriculture. The most important ones are:

1. **Regional priorities:** The remote regions of India, especially the North East is to be given priority for launching the S&T based Agricultural development programme using ICT in a significant way. The 'e-connectivity' programme implemented by Government of India in KVKs would have been more beneficial to the remote regions like NE region since other connectivity options are also limited or nil for KVKs here. In areas of mainland, KVKs can utilise public as well as private facilities which are very common.
2. **Information, knowledge and skill empowerment of SHGs.**
3. **Every village knowledge centre:** ICT to all the 6, 00,000 villages by 2007 – 60th anniversary of our independence. Not achieved yet.
4. **Domestic Software Development and Application:** Government Projects mainly provides static information. Hence, dynamic information like wealth, markets, health, and other day to day information needs to be given priority.

5. **Community Radio:** For eg. Fishermen in Catamarans, Government of India should liberalise policies for the operation of community and farm radio thus reaching the unreached through the integrated ICT system.
6. **Technology upgradation in villages**
7. **Content creation:** consortium of content providers will have to be developed for each agro climatic zones.
8. **Women and ICT**
9. **Participatory knowledge system:** E-governance is invariably a passive system of information empowerment. Hence, there is a need for promoting participatory methodologies of content creation & knowledge management. The present approach is of partnership and not patronage. Farmer Participatory Knowledge System (FPKS) could replace the existing beneficiary and patronage approach to knowledge dissemination.
10. **Sustainability and replicability: s**hould be the bottom line in the development of National Action Plan for the 'every village a knowledge centre'movement with involvement of Gram Sabha & Panchayat.
11. **Virtual Academy for Food Security and Rural Prosperity.**
12. **Political commitment.**

9.29 Future Outlook

India is a country with over 1 billion population and 5 million computers. 80% of the 5 million computers used in offices and hardly, 20 per cent are available for use in development work. Despite all the barriers, the Indian agriculture is bound to adopt and implement ICT to double the agricultural production. This aim can be achieved only when there is proper utilization of ICT and more investment in it. As ICT helps in information dissemination in less time with effective ways of communication, its implications cannot be ignored by KVKs. There is a great scope to implement ICT in order to communicate and integrate the complete agri-food supply chain, as the e-choupals are doing in Madhya Pradesh to procure soyabean. The other beneficiaries of ICT can be food-processing companies, and suppliers within the agri-food sector. On the other hand, the need to market the agricultural produce at reasonable prices will also change the farmers' attitude, and they will be more dependent on ICT. ICTs will, thus, definitely help the KVKs in sustaining the Indian agriculture.