INFORMATION TECHNOLOGY: A BOON FOR INDIAN AGRICULTURE

Vinod kumar[1], Ashok Kumar Sharma[2] & Arvind Kumar[3]

ABSTRACT

The development of novel and affordable information and communication technologies and the emergence of information society with new economic models have the potential for making major contributions towards sustainable agriculture production. Twenty first century's information society is being built on technology, knowledge and intelligence. Information technology (IT) empowers both farmers and machines with information, which is transformed into knowledge and intelligence. Appropriate use of the knowledge by both farmers and machines contributes to sustainable agriculture. The informed and empowered farmers know their role in an environmentally sustainable society.

Key Words : Novel, Affordable, Information, Emergence, Information Technology, Sustainable Agriculture.

INTRODUCTION

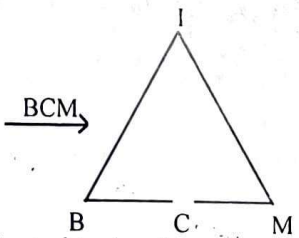
In this globalization of market, investment and economic integration, information technology advance can be spread over around the country with the potential to enhance the agricultural productivity, incomes and the quality of life of Indian farmers. The focus of technology development in agriculture in the last half the 20th century was to increase the production efficiency on the farm by innovation in machinery, pesticides, fertilizers plant breeding etc. This was the supply driven focus, consumer also benefited from increased production of basic commodities. But in this globalization, Indian farmers need to be updated with latest knowledge to compete for global marketing. He must have the information like: New techniques of farming, new method of cultivation, new crops, seeds, insecticides, pesticides, water and nutrient management and marketing of product, Government policy regarding agriculture, uses of fertilizer for high productivity, crop disease preventive measures, advice on crop rotation to maintain soil quality, export potential of their crop, information about agriculture allied activities like dairy, pig poultry, weather information local, regional level, etc.

The farmers who access these information have a better chance of succeeding than those who do not access the same. At the end of the 20th century, innovations in many non-agricultural fields contributed to new technologies in agriculture. For example, satellite technology, computers, T.V. and telephones etc. allowed a farmer to manage the use of pesticides, fertilizers, and water more efficiently by tailoring input amounts to the specific characteristics of the field. The use of these farming technologies may reduce both input costs to the farmer and chemical runoff to the environment.

The 21st century has been described as the "information age." Innovations in computing capabilities and low-cost access to computers have dramatically enhanced the ability to store and analyze data. In addition, today's communication networks have facilitated the rapid exchange of information. Firms can access consumer demands throughout the world. The farmers can produce value-added crops for specific markets and scientists can collaborate with researches around the world in data gathering and analysis.

To improve the economic efficiency three priority areas are opportunity, empower and security. Opportunity makes markets work for the farmers and expands farming community assets. Empowerment makes state institutions work better for farming community and removes social barriers. Security helps in farmers manage risk. In light of current experiences in rural India it is apparent that it is defined as the set of activities that facilitates the capturing, storage, processing, transmission and display of information by electronic means that can be utilized for sustainable economic development of the farmers. The use of IT applications can enhance farmer's opportunities by improving their access to markets, health, and education.

Potential of IT to Improve Production and Economic Efficiency



B -Biology oriented technology
C -Chemistry oriented technology
M -Machine oriented technology
I -Information technology

1. Scientist (Computer Applications in Agril.) 2. Scientist (Ag. Extn.), 3. Director, NRCRM, Sewar, Bharatpur.

In above diagram left side is the conventional pattern of agriculture and dot between these technology shows that all three technologies exist in isolation therefore full synergy effect cannot be expected. Right side shows the agriculture with IT, four technologies are linked just like a bond of an organic molecule. The integrated use of technologies can drive synergy effect to the fullest extent.

IT Infrastructure and Access in India

The most commonly available IT tools in Indian context are Radio, Television, Telephone, Newspaper; Computer, Internet, Expert systems. The infrastructure of India for the year 2001 is given in table 1 below.

Table 1. IT Infrastructure in India

Available IT tool	India (2001)
Telephone mainline (Per 1000)	38
Mobile (Per 1000)	6
Daily news paper (Per 1000)	60
Radio (Per 1000)	120
Television (Per 1000)	80
Personnel computers (Per 1000)	5.8
Internet user (thousands)	7000

Source : Development data group, World Bank

Radio :

Radio is the oldest IT tool and provides entertainment to masses to a great extent in recent past. Its reception facilities through local radio, regional broadcasting stations and FM transmitters have increased dramatically. When India attained Independence in 1947, AIR had a network of six stations and a complement of 18 transmitters. The coverage was 2.5% of the area and just 11% of the population. Rapid expansion of the network took place post Independence. AIR today has a network of 214 broadcasting centres with 143 medium frequency (MW), 54 high frequency (SW) and 139 FM transmitters. The coverage is 91.37% of the area, serving 99.13% of the people in the country. AIR covers 24 languages and 146 dialects in home services. In external services, it covers 27 languages, 17 national and 10 foreign languages. These have opened the new possibilities to bring area/regional specific technologies and consequently their development and refinement to provide conceptual or issue based information to the masses.

Television :

Being for communicating with audience with low literacy skills, an audio-visual medium, TV, has been very strong advantageous than other medium. The large number of TV transmitters, Doordarshan and other channels cover entire population. India started black and white Television broadcasting in 1959 and TV programme especially for agriculture extension started in 1975-76. At present, there are only two terrestrial TV Channels of Doordarshan (DD I and DD II) available in the country, though about 100 satellite Channels are being received in different parts of the country. The DD I is received in about 76.8% of area of the country covering about 89% of the population. The Doordarshan setup of India for the year 2003 is given in table 2 below.

Table 2. Doordarshan Setup of India

DOORDARSHAN-TO DAY	
Channels	23
Studio Centres	56
Transmitters	1.314
Weekly programme output (Hours)	1.485

Computer and Internet :

The Internet is emerging as a potential tool to contribute to agriculture developments, one can access to vast global information recourses. It enables communities for two-way communication. it offers important opportunities to knowledge sharing, awareness of alternative perspectives, improve governance, raising efficiency, transparency, participatory systems, improve social and human conditions, expands access to better quality education, healthcare, disaster relief capacity and other services, reduce poverty, etc.. It opens new opportunities for bypassed groups (women, the poor, rural populations, children) introduce economic opportunities. E-commerce, IT-sector development, etc, improve environmental management. GIS, food security early warning systems, support indigenous knowledge, etc. In the last decade the growth of Internet in India has taken rapidly. Table 3 shows the number of Internet connection as well as Internet users.

Table 3. Growth of Internet in India

Month / year	Internet connection	Internet user
March 1996	0.05	0.25
March 1997	0.09	0.45
March 1998	0.14	0.70
March 1999	0.28	1.40
March 2000	0.90	2.80
March 2001	2.50	7.00
March 2002	4.50	13.50
March 2003	10.0	30.00

(Figures in Millions)

Telephone and Mobile :

Telephone is also one of strong way of communication .In India the teledensity- the number of telephone mainlines per 1000 peoples has significantly improved between 1997 and 2002 as shows in table 4.

Table 4. Telephone Mainline in Different States of India

States	Telephone Mainlines per 1000 People		
	1997	2002	Changes (1997-2002)
Punjab	33.4	61.8	+85%
Maharastra	33.8	52.8	+56%
Kerla	26.7	46.8	+75%
Tamilnadu	21.4	37.2	+74%
Gujrat	24.4	36.9	+49%
Haryana	20.0	33.1	+66%
Karnataka	19.8	32.6	+65%
Rajasthan	13.2	26.7	+95%
Andhra Pradesh	13.5	22.0	+63%
Madhya Pradesh	10.6	18.2	+72%
West Bengal	9.6	13.1	+45%
Uttar Pradesh	6.8	12.5	+84%
Orrisa	5.6	9.6	+63%
Bihar	3.6	5.6	+64%

The recent data shows about 84% village has connected with telephone under village public telephone scheme. Table 5 shows the status of VPT on 19 March 2004 and table 6 the mobile status in India

Table 5. Status of VPT on 19 March 2004

S. No.	Circle Name	Villages with VPT	Uncovered Villages	In. (%)
1	Andaman & Nicobar	198	8	96.1
2	Andhra Pradesh	22918	6297	78.5
3	Assam	18025	6660	73
4	Bihar	38450	124	99.7
5	Chhatishgarh	14030	5966	70.2
6	Gujarat	11308	7323	60.7
7	Haryana	6762	7	100
8	Himachal Pradesh	16645	434	98.2
9	Jammu & Kashmir	4035	3053	56.9
10	Jharkhand	26319	5822	83.1
11	Karnataka	27011	0	100
12	Kerala	1370	1	99.9
13	Madhya Pradesh	37623	14167	72.7
14	Maharastra	31993	9616	78.2
15	North East 1	2324	4735	32.9
16	North East 2	1639	5591	22.7
17	Orissa	39909	6582	86.2
18	Punjab	12688	2	100
19	Rajasthan	23928	17587	59.2
20	Tamil Nadu	17898	1	100
21	Uttar Pradesh (E)	75854	5395	96.8
22	Uttar Pradesh (W)	21261	2340	99.8
23	Uttaranchal	11774	4412	73.9
24	West Bengal	37161	1974	95.4
	Total	**501123**	**108097**	**83.4**

Source: Village Public Telephone Database & Monitoring System, Department of Telecommunications

Table 6. Mobile phone status in India

City/Circle	Sept 2003
All metros	6118850
All India	18306142

Source : Cellular association of india

Call Centers for farmers in India :

The union cabinet is now formally approved the floated plan for the call center meant for the farmers. This is one of its kinds in India for the farmers. The Call Centers are known by the name 'kisan' Call Centers, and answer queries in local languages.

The Call Centers have been operated since 21st of January 2004. It is being operated through toll-free telephones bearing the number 1551 from eight selected locations covering all states and regional languages. These Call Centers is operated at three levels ; namely, the first tier would provide immediate replies to farmers' queries. Unanswered questions would be transferred to specialists at the second tier. The extension functionaries would refer questions that still remained unanswered to experts at the third tier for reply through phone, post or personal visit. The Mumbai, Kanpur Bangalore, Chennai, Hyderabad, Chandigarh, Delhi and Kolkata are the locations in India, where these Call Centers are situated at present. Moreover, each Call Center is covering more than a state in India.

Expert System :

One of the greatest problems remain is that of transferring new technology from research laboratory to the field. The expert system technology provides ready access to information on improved varieties, crop management, fertilizer management etc. to extension workers and farmers. This new technology provides expert advice immediately in detail and accurate. Some Agricultural Expert systems are:

Rice-Crop :

National Institute of Agricultural Extension Management (MANAGE) has developed an expert system to diagnose pests and diseases for rice crop and suggest preventive/curative measures. The rice crop doctor illustrates the use of expert systems broadly in the area of agriculture and more specifically in the area of rice production through development of a prototype, taking into consideration a few major pests and diseases and some deficiency problems limiting rice yield.

AGREX :

Center for Informatics Research and Advancement, Kerala has prepared an Expert System called AGREX to help the agricultural field personnel for giving timely and correct advice to the farmers. These expert systems

find extensive use in the areas of fertilizer application, crop protection, irrigation scheduling, diagnosis of diseases in paddy and post harvest technology of fruits and vegetables.

FARM (RM) :

Fertilizer Application Recommendation Manager (Rapeseed-Mustard) is an expert tool has been developed by National Research Center on Rapeseed-Mustard for efficient utilization of fertilizer for production of rapeseed-mustard in India. The FARM (RM) provides fertilizer information, options and suggestions for making decisions regarding economic application of fertilizers based on recommended doses of fertilizer for different states of India.

CONCLUSION

Information technology can facilitates fast, cheap, equitable, and resource-efficient access to information, accumulate knowledge, learning opportunities for farmers. Internet, today's cyberspace, facilitates people from across the country to co-operate and perform various activities. Processing, storage, transmission, and sharing of information in electronic form, without any spatial or temporal constraints, empower people with instant information along the desired lines. Information analysis contributes to knowledge and intelligence, which have increasingly become commodities in the information age. As information becomes accessible to anyone and anywhere, it is increasingly becoming a basic economic resource and a structuring factor in today's society.

REFERENCES

1. http://www.moc.gov.in/circle.asp
2. http://www.upe.bsnl.co.in/network_villgraph.htm
3. http://www.coai.com/stats.2003.q3.htm
4. Pigato, Miria(2001). "Information and communication technology, Poverty and development in sub-sahara Africa and south Asia" [www.worldbank.org/afr/wps http://www.worldbank.org/afr/wps].
5. http://www.manage.gov.in/managelib/faculty/PanduRanga.htm
6. Ajit Maru "Information and Communications Technology Use in Agricultural Extension in India"[www.agricta.org/observatory2003/ppt_presentations/ country_case_India.pdf]
7. WINROC International 2003." Future direction in agriculture and Information and communication technology (ICT's) at USAID.[http://www.dot-com-alliance.org/documents/AG_ICT_USAID.pdf]
8. http://allindiaradio.org/
9. http://www.odi.org.uk/agren/papers/agrenpaper_135.pdf

■ ■ ■ ■ ■