

ROLE OF EMERGING TECHNOLOGY AND EXTENSION PROGRAMME IN SUSTAINABLE AGRICULTURAL DEVELOPMENT

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ABSTRACT

The population of India has already crossed 1.21 billion and still increasing, putting a great pressure on the food production of India. It is an acceptable fact that India achieved a marvelous success in increasing food production from 51 million ton in 1951-52 to 259 million ton food grains but still India continues in the “Alarming” category of countries by severity of hunger. This poses a great challenge.¹

Even today, Agriculture continues to hold main key to country’s GDP, food security, employment and income generation.

Over a period of time, agriculture is undergoing a change towards high value crops, seed varieties, use of chemical inputs and cultivation practices. These external inputs have substituted natural processes and resources, rendering them less effective. The main challenge towards achieving sustainable agriculture is to make optimum use of internal resources.

Science, Technology and Extension can play a vital role in achieving technological empowerment and sustainable livelihood at the grass root level, which is very much essential for nation’s development. Advances in instructional and educational technology have transformed educational system as a whole and agriculture is not an exception. The Extension programmes help to expand or extend the work of universities beyond campuses and into neighboring communities. American Congress created the extension system nearly a century ago to address exclusively rural agricultural issues. With the use of innovative educational methodology of case studies, project work and self-education aids, teaching and learning process has become interesting and inspiring. Thus, process of teaching and learning is undergoing a sea change with increased use of ICT’s.

With Globalization, it is need to transform Indian Agriculture into a profitable enterprise, with increasing productivity per unit of land area, increase farm efficiency, optimizing use of resources, and maintain sustainability and consistency in production. ICAR and Agricultural Universities are playing a catalytic role in spreading Agri-education in the country.

Key words- GDP, ICT, ICAR, SWAN.

Background and Necessity:

Increase in population is not a new phenomenon to India and its political leaders. Government was aware of the situation and has tried to overcome the problem. But today, no one from India can claim that India has solved the

overpopulation problem. The entire census exercises undertaken after independence had highlighted the problem. During last forty years i.e. 1971 to 2011, India’s population increased from 54 core 81 lacks to 121 core i.e. doubled during 40 years. This has happened, though we

were able to control & reduce the rate of increase in each and every census. It is a good sign that has been noted from 2001-2011 census that India has able to control the rate of increase in population.

Period	Increase in Population
1971-1981	13 cr. 52 lac.
1981-1991	16 cr. 30 lac.
1991-2001	18 cr. 23 lac.
2001-2011	18 cr. 15 lac.

It is expected that by 2025, country's population may touch 131 cr. and to feed this population country will need 32 cr. tones of food grains. Our present food production is around 25 cr. tones, this means country should increase the food production by 25 to 30 % every year. Increase in food production can be achieved by bringing additional land under farming but as there is no additional balance land for farming, we have to search an alternative. Country has no alternative than to use of latest technology and modern farming techniques. Increase in population poses a major challenge not only to policy makers and government but also more directly related to the agricultural scientists, administrators, educationalists and extension workers. Another problem before the nation is of unemployment, under employment and disguised employment mainly in rural sector. It is said that India's agriculture sector is loaded with manpower in comparison to its output. The latest report submitted to Reserve Bank notes that 73 % of farmers are away from bank loan.² So, it is necessary to train farm community in such way that they will use advanced technology and techniques to increase productivity.³ Agriculture is the oldest occupation of mankind. The practice and methods of farming had changed to fulfill the needs of rising population. Agriculture is also a most important sector in Indian context as it employs 70% of its workforce and majority of

the rural poor population is directly hampered by its performance. The sector is under pressure to meet the requirements of growing population due to depleting natural resources changing climatic conditions leading to increase in the number of farmer suicides. Government of India (GOI) is meeting this challenge by improving infrastructural facilities and propagating modern farming techniques along with introduction of new farming sectors. GOI's vision 2020 envisages providing information and communication technology (ICT) network within the country and creating a platform for farmers, scientists and researchers. GOI has formulated a nationwide strategy to integrate ICT with Agriculture Information Delivery, National Data Centers, Knowledge Banks, Kisan Call Centers and starting a web based trading platform "AGMARKNET" to facilitate marketing of agro-products at competitive price.⁴

Role of ICT

The ICT can generate new opening to bridge the gap between information haves and information have-nots in developing country as India. The task force have a great task to harness ICT for community transformation. It has been proved that emerging ICT can play a momentous role in overall agricultural development. It is a fact that rural community still today has problem in accessing essential information to make timely decisions. It is necessary that information accessibility should be demand driven rather than supply driven. The challenge is not only to improve the accessibility of communication technology to rural community but also to improve its significance relating to local development. Recent ICT developments are proved to be useful in rural areas and can facilitate advanced communication, boost up participation, disseminate information and distribute knowledge and skills. It is said that

extension through information technology would be a major form of technology dissemination that can fulfill expectations.

Access to information in understandable manner can educate farmer to use better techniques in farming, can enhance his negotiation skill with better marketing techniques, introducing his product in new markets i.e. towards widening his market share. Thus technology can offer a promising potential for the social and economic empowerment of farmers living anywhere in the country. In 70's Indian farmers had successfully introduced new varieties of wheat and rice leading to Green, Blue and Yellow revolutions that has proved Indian farmers initiative to absorb new techniques and find the ways to improve.⁵ Milk, Fisheries and Oil seeds witnessing the Golden Revolution in the field of horticulture crop production.⁶

The problem of Indian Agriculture lies in inadequacy and inefficiencies in the dissemination of information at grassroot level. ICTs can support many activities starting from seed, fertilizer and selection of particular crop i.e. all related to increase productivity. ICTs can also support activities by providing information on price variations in different markets to realize better price along with increase in product visibility, traceability and certification.⁷ More than 75% of farmers from Mali and Burkina African countries formed associations to harness potential of ICT. Grameen Phone, the largest mobile operator from Bangladesh formed Community Communication Centers (CIC) to increase connectivity, service offer, capacity building solutions and farmers with these services had benefited in saving crops and finding new markets.⁸ GOI's vision 2020 document visualizes that "the tools of ICT with networking of agriculture sector all over the country and also globally will bring farmers, researchers, scientists and administrators

together with the establishment of "Agriculture Online" to exchange of ideas and information"⁹

Role of Indian Council of Agricultural Research (ICAR)

It is one of the largest national agricultural research institute in the world with 99 institutes, 69 agricultural universities and 637 Krishi Vigyan Kendras across the country. ICAR is IS/ISO 9001:2008 certified organization.

The institute ushered Green Revolution followed by major transformations that culminated into food and nutritional security in the country.¹⁰ Krishi Vigyan Kendras (KVKs)

KVKs centers are arm of Indian Council of Agricultural Research (ICAR) are spread all over the country to demonstrate location specific technologies to farmers in the field. This has significantly contributed to increase production and productivity of farming system in various agro-eco situations.

KVK Baramati:

One of the key KVK centres that actively involved in training, education, demonstration and in innovative work. The centre has a four star nursery community radio station and Sharda Kishi Vahini that broadcasts agriculture, health and livelihood programmes daily for three hours. The centre has won many national awards.

ICT Infrastructure in India:

ICT movement is still evolving in India. The development in ICT domain is not uniform and with disparities among different regions in the level and quality of telecommunication network. Power supply position is not satisfactory, nearly one lakh villages are still without power and most of the states are facing intermittent power cut. GOI has started many projects in power sector and are expected to improve the scene.

Nuclear projects are on its way to completion and will add to supply grid. Gujarat became the first state in the country to achieve 100% rural electrification with 24x7 three phase supplies and the state has achieved village level broadband connectivity all over the state.¹¹ Bandwidth of 100kbps is the minimum requirement to run the internet satisfactory and most of the Indian villages are facing the problem. Connectivity is the main issue in rural India and GOI is trying to overcome it. Urban tele-density has been consistently increasing and reached to 100% in 2009, while rural tele-density was at 16.64%.¹² Infrastructure needs more attention to bridge the gap between rural and urban India and GOI has taken actions with SWAN network all over the country and with liberalization of telecom sector supported by regulatory mechanism and changes are visible in last two years. The industry has high expectations of 500 million mobile subscribers and two million internet users.¹³

Challenges and Opportunities before Indian Agriculture Sector :

It should be the foremost duty of Indian Agricultural Educational Planners to introduce IT in all agricultural colleges and institutes and link them with each other to make use of their libraries, research activity and in establishing data bank for the use of researchers and students. IT can be used as a best medium for research documentation, experiments and analysis of results presentations. In the changing global scenario, it is necessary to link Indian agriculture with world community so that IT can fulfill this task.

The major challenge in front of agriculture sector is to feed growing number of people in the country. Factors such as depletion of natural resources, soil fertility, water shortage, climate change and rapid decrease in fertile land and non-availability of farm labour force due to

urbanization and industrialization are affecting food production. The agriculture sector can face challenges with improved irrigation facilities, drip irrigation, better market access, strengthening road, rail and air accessibility all over the country and arranging training facilities to farmers and depressed classes.

Cyber extension services through Kisan call centres, kiosks and smart phones can extend e-mail dialogue services. Media, radio, mobile phone can also play a major role in communication with learned people and can guide rural folks. With such advanced technological aids farmers can turn challenge in to opportunities. World Bank has sanctioned a loan of \$100 million to Maharashtra Government to implement competitive project in Agriculture sector.¹⁴ Maharashtra has projects such as Warna Wired Village, Pravara Village IT Project, AQUA multilingual question answer forum serving this sector. Private players as ITC's e-Choupal, Mahindra Kisan and Tata chemical are also serving farmer community.

Agricultural Extension:

Agricultural Extension is a system of out of school education to rural people.

Agricultural Extension is a term used to impart latest technological devices and scientific research in agricultural field to farmers. The field of "Extension" with a wider range of communication devices and learning activities organized for villagers by educators, technocrats, government officers from different disciplines in the field of agriculture, agriculture marketing, seeds, land quality, use of fertilizers and water, climate conditions and its variations, international forecasts about different produce etc. Extension practitioners are represented by professional organizations, NGO's, government agencies and scientific journals and universities. Agricultural extension agencies in developing countries are receiving large amount of support

from international agencies as World Bank, Food and Agricultural Organization of UN's.

The term extension was first used in England in 19th century, to extend work of universities beyond its campus. The same term was in use in US but later replaced by "advisory service" in 20th century. "Extension Agent" is a university employee, who develops and delivers suitable educational programs and assist people in economic development, leadership, family issues, agricultural empowerment and environmental issues. "Extension Agent" has the task of bringing suitable scientific knowledge to farm families. He will assist farmers in identifying and analyzing their production problems and he will make them aware of the opportunities for improvement and better price realization. All this exercise will help farm community to form sound opinions and good decisions to achieve better standard of living and attain sustainable development.

Four Types of Extension in Asia ¹⁵:

The development of agriculture in Asia differed from country to country but variations can be grouped into four types and India is no exception.

1) Colonial exercise :- Focus attention was on export crops such as tea, rubber, cotton and advice was provided to large landowners and plantation managers.

2) Diverse top-to-down approach:- After independence, commodity specific extension services established, with production targets fixed by five year development plans. Various schemes were started.

3) Unified top-down approach:- During 70's and 80's the Training and Visit (T&V) extension programme was initiated as recommended by World Bank. Existing programmes were merged into single one and adopted "Green Revolution" technologies all over the country.

4) Diverse Bottom-up-approach:- T & V approach was derailed with World Bank's withdrawal and then central planning involvement came to decline resulting in replacing top-down approach.

Important aspects in extension education:-

- Selection of extension system and approach.
- Noting future initiatives to be accommodated.
- Participation of farmer community.
- Web enabled suitable technology dissemination.
- Developing case studies with technology dissemination.
- Scaling up and promoting of group mobilization.
- Aim should be to make "Agriculture as a profitable venture".

Agricultural Extension can be followed under four paradigms Programmes. They are 1) with technology transfer, 2) With advisory work, 3) with training to farmers and 4) with farmer to farmer exchange service.

Farmers should also be trained as extension agents to deliver programmes such as gardening, health and safety and consumer issues. They should be made aware in use of natural resources, to protect environment, water and waste management, recycling etc. Ultimately with the extension programme, farmer's families should become resilient and healthy by teaching nutrition, food preparation skills, positive child care, family communication and better financial management. Another goal of extension is to develop coordinated efforts to create viable options such as job creation and job retention, starting of small and medium sized business venture etc. Regardless of programme Extension agent should meet public needs at local level.

Conclusion:

The major problems that confront extension are related to the failure to respond emerging needs of farmers under the training and visit program. There is declining trend in budget of extension programme resulting in staff shortages and contraction of extension services. Alternatives to extension are under consideration in terms of institutional changes, cost recovery initiatives, commercialization and privatization as noted by Ariel Dinar in 1996.¹⁶

Extension agent to farmer ratio in India is estimated at 1:2000. Public extension services are criticized for being technically weak, offering insufficient coverage and contacts with farmers. It is argued that 1/3 of the technologies

generated by agricultural universities and ICAR institutes in India were not reached to farmer's field due to lack of extension model. ICTs offer ample opportunities to change the situation and accomplish the challenge.¹⁷

During last fifty years agriculture development policies are successful at emphasizing external inputs as the means to increase food production. This has led to increase in consumption of pesticides, inorganic fertilizers, animal feed-stuffs etc. The basic challenge before the agriculture sector is to minimize the use of external inputs, regenerate internal resources and combination of all resources in more effective manner. This can bring both environmental and economic benefits to farmers.¹⁸