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Factors Inhibiting the Education Specialists/Agents in Transferring Technology from Lab to Land in India

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ABSTRACT

Extension education is an important step for the sustainable development of human welfare based on the socioeconomic and other important circumstances. This education must adapt to technology transfer procedure in terms of lab-to-land conversion without affecting the wild or common procedures. Many factors which affects the dynamic extension education in order to transfer technology in India are found to be poor literacy, communication, economic status, availability and adoptability and private and government sectors. This review papers addresses the factors which affecting extension education agents in technology transfer in India with special reference to lab-to-land (agriculture) phenomena. It has been provided important effective measures and ideas for better technology transfer procedure and sustainable development of human welfare.

Key words: Technology transfer, extension education, factors, lab-to-land, agriculture

INTRODUCTION

The goals of agricultural extension include transferring information from the global knowledge base and from local research to farmers, enabling them to clarify their own goals and possibilities, educating them on how to make better decision and stimulating desirable agricultural development (Van den Ban and Hawkins, 1996). Several researchers have attempted to understand the factors that stimulate or affect intrapreneurship and during researches, a number of organizational and external factors have been identified (Guth and Ginsberg, 1990; Miller, 1983; Kuratko *et al*., 1990; Heinonen, 1999). Reviewing the literature of entrepreneurship within organization also shows that a group of authors highlighted the importance of organizational factors for the pursuit of intrapreneurship (Antoncic and Hisrich, 2001; Covin and Slevin, 1989). Based on previous researches, variables such as management support and behavior (e.g., vision, commitment, support and style) organization culture, structure and mode of action can affect intrapreneurship (Covin and Slevin, 1989; Zahra, 1991; Antoncic and Hisrich, 2001). Agricultural extension is a branch of applied science, the implementation of which is required to bring about desirable changes in the agricultural sector by applying the latest scientific and technological methods. Hence, extension education thereby helps the farmers to improve their standard of living and income.

DEFINITIONS AND ROLE

There are some definitions and role of the persons to be understood before proceeding to the review. Extension education is concern with technology transfer, three important personnel or persons play an important role in order to transfer technology from lab-to-land. They are: (1) Researcher, (2) Extension worker and (3) Farmer (Felsing and Haylor, 1999).

Researcher: Innovations and discoveries have important role in agriculture extension. The traditional role for formal researchers in the development sector has been the production of a finished non-adjustable package of recommendations to field level extension workers, whoever hopeful can interpret and then teach these to farmers which includes field trials and evaluations, adoption, communication and diffusion of the ideas, overcoming the problems of the rural people and strategic combinations of workable technologies. Often research and extension organizations centralize and standardize information in order to provide simple all-inclusive solutions or technical recommendations.

Extension worker: The role of the extension worker has been to demonstrate acceptable improvements and seek ways of bringing their adoption within the grasp of farmers. Education helps to work in extension activities, it establishes job-performance, helps in achieving team spirit, trains the personnel as an in-built and continuous process and it can develops the morale of the workers and makes them highly professional in the above roles.

Farmers: Agriculture extension education is basically meant for the farmers and rural people. They help the rural people in following ways. There is commonly little role for farmers in the development of the research agenda or the adaptation of innovations. They have been traditionally viewed as passive recipients of packaged solutions; something they clearly are not.

It educates people leading to behavioral changes in the desired direction. It motivates people and informs them to adopt innovations. It involves active participation and decision making ability of the people. It brings permanent improvement in the living conditions and also suggests alternative fields and resources for better earning. It develops people's own program. It creates a proper learning situation.

In case of agriculture extension education plays a very important role in motivating the ideas, supplying new technologies for better production, etc. The role of agriculture extension education centers consist of four units. They are farmers or rural people, innovation or discoveries or inventions, extension workers or educators or specialists and in general extension services. Agriculture extension education in general helps the rural people in following ways:

- It develops leadership in local and professional situation. It develops, strengthens and organizes the groups, institutions and people to achieve their objectives. It makes the planners, policy makers and administrators familiar with local conditions and the latest technology suited to it. It provides sufficient data for developing plans and coordination of activities. It gives direction and package of educational practices for adoption and diffusion

RELATIONSHIP BETWEEN AGRICULTURAL EDUCATION AND RESEARCH AND EXTENSION

The institutional relationships between agricultural teaching and research and extension services are inadequate. In many countries, this is the result of the deliberate separation of

education, research and extension into different ministries and agencies and a lack of functional mechanisms to link them together to solve common problems.

Agricultural research is usually conducted at government research stations and laboratories, the majority of which are not linked with universities. Research activities are often carried out as part of postgraduate programs of higher agricultural education but they are seldom directly related to national research priorities and programs.

In India, agricultural universities carry out an important part of research activities and are integrated within the programs of the Indian Council for Agricultural Research (ICAR). Some specialized centers of ICAR in turn, offer postgraduate MSc. or Ph.D. training programs. Another example is the Colegio de Postgraduados in Mexico which was created specifically to balance research, postgraduate teaching and extension activities.

One way for universities and technical institutes to implement development outreach activities is by follow-up technical support to graduates working in agri-businesses or managing their own production enterprises. Also, short courses of continuing education can be designed to update extension officer's knowledge and to qualify extension staff for career advancement. Continuing education should, wherever possible, make use of farmer's associations, graduate associations, NGOs, commercial enterprises and research and extension centers.

Agricultural education institutions, working with appropriate government agencies and NGOs, need to develop research and demonstration plots that directly address farmer's needs. This requires that farmers be valued for their contribution to production through their innovations and sharing of local knowledge. For their part, farmers' organizations need to do a better job of communicating the needs of their members to agricultural education institutions. Farmer advisory boards are one way to improve communication between agricultural education institutions and local producers.

Recent issues: There are prodigious body of extension work has been done in aquaculture for the benefit of farmers. In Eastern part of India, aquaculture extension planning case study has been proposed by a DFID research project (Felsing and Haylor, 1999). Lashgarara and Saharkhiz (2012) stated that factors affecting the participation of Fars province's aqua culturist in extension-educational course in Iran. In Iran aquaculture is an important activity through which utilization of water resources can be increased and needed protein can be supplied.

Factor affecting the dynamic extension education: Various factors involved on extension education agents in transferring technology from lab-to-land. It has been various non-experimental data provides us to understand the barriers or factors affecting the technology transfer.

It has been reported that people involvement in the decision making process, plan conduction, evaluation and sharing of their developmental plans are the important factors (O'Kelley and Marsden, 1989).

Lashgarara and Saharkhiz (2012) stated that the effects mentioned factors on the aqua culturists participation, information shows that in the opinion of the respondents, the effects of social, economic, environmental and extension factors on aqua culturists participation is much, moderate high and much in, respectively.

Another interesting study reported that variable of age, sex, level of literacy and income affect the participation. Older people, women with low hierarchy have a lower participation rate. One of the important factors affecting participation is that participation rate is more in the higher level of education then lower one (Roussel, 2000).

There was a positive and significant relationship between farmers memberships in club, rate of low property lands, rate of listening to radio's educational programs, propensity to the regions agriculture advancement, being elected as premier farmer and access to agricultural inputs with rate of participation (Bastami, 2000).

Extension education in India: Extension education in general and agriculture extension in particular efforts in India have made significant strides towards development of the agricultural sector. National commission on Agriculture (GOI., 1976) reports has emphasized the need for massive extension efforts to modernize the outlook of the farmers and to make them more enterprising and willing to adapt readily to innovations for that only it can increase the agricultural production. The development of extension education in India is summarized with objective, year and the projects (Table 1).

Table 1: Development of agriculture extension in India

Project	Year	Main objectives
Community Development Programme (CDP)	1952	To raise the economic and social level of the rural people
Intensive Agricultural Development Programme (IADP)	1961	Providing know how for production
		To aim at augmenting production to the extent of 50-60% in the districts covered by the program
		Developing good livestock and poultry
Intensive Agricultural Area Programme (IAAP)	1964	Providing know how for production
		To aim at augmenting production to the extent of 50-60% in the districts covered by the program
		Developing good livestock and poultry
High Yielding Varieties Programme (HYV)	1966	Evolving cost reducing- high yielding agricultural technologies
		Importing dwarf varieties for production
National Demonstration Programme (NDP)	1965	Introduced the concept of productivity per unit area per unit time
Operational Research projects (ORP)	1971	To test, adapt and demonstrate the new agricultural Technology in farmers field
		To calculate profitability of new technology meant for increasing production and returns substantially
Lab to Land Programme (LLP)	1979	To transfer latest agricultural Technology to the small, marginal farmers and landless laborers
		To enhance their socio economic conditions, through adoption of diversified agriculture
		To generate more employment
Training and Visit System (T and V)	1974	Transfer of knowhow from research scientists to extension workers through subject matter specialists
		Transfer of knowhow from extension workers to farmers
National Agricultural Research Project (NARP)	1980	To upgrade and strengthen the regional research capacity of state agricultural universities to conduct location specific programs
		Production cum problem oriented researches in the various agro-climatic zones identified in their respective areas
		Rain fed farming with special reference to cereals, pulses and oil seeds
National Agricultural Extension project (NAEP)	1983	To overcome various organizational, structural and functional constraints that have been identified during the operation T and V system

Courtesy: Agriculture extension: Booklet No. 229; Agricultural Extension and Education: AEES-12

The principles, methods and techniques are applicable in extension education is not restricted to agriculture and also to other sciences such as veterinary, animal husbandry, dairying, health and family planning. Agriculture extension viewed as an educational program to be undertaken by public agencies to activate the process of transferring knowledge, science and technology from laboratories to people or farmer and to help them in farm planning, decision making, record keeping, use of inputs, storage, processing and marketing, ensure supplies and services, increase their production, develop people and their leaders, improve their occupation, family and community life.

Extension education in Tamil Nadu: Governor Surjit Singh Barnala has said that only an effective transfer of "Lab-to-land" agricultural technology can ensure that small and medium farmers in south India reaped the full benefits of the green revolution.

Furthermore, every technology should be useful to a large number of persons and the country at large. If it favors only a privileged few, it will result in social and psychological disturbances and also stated that nanotechnology was a laudable one as Countries (debuting) into newly evolving technologies, can leapfrog into the most advanced technologies directly, without having to go through various stages of technology development.

Limitations: There are some conditions under which the program planning process may lose much of its effectiveness. They are limited availability of information, knowledge about current technology and infra-structure, availability of time in planning and implementation, availability of inputs and services, facility in marketing the product, limited availability of credit, restrictive rules and procedures and future development.

Action taken: The challenges not withstanding, the topic "Technology transfer" has spurred great interest among academic researchers and policy-makers. Among some indicators of technology transfer's ascension are the following. Since 1980, the US Congress has passed no less than eight major policy initiatives dealing with technology transfer and means of promoting it; similar trends have occurred in other nations (Lederman, 1994; Fujisue, 1998; Licht and Nerlinger, 1998).

A major accomplishment of Independent India is the development of a dynamic national agricultural research, education and extension system. We have a well established network of State Agricultural and Animal Sciences Universities and National Research Institutions and All-India Coordinated Research Projects supported by the Indian Council of Agricultural Research. Therefore, we have opportunities to produce food and other agricultural commodities, particularly fruits and vegetables, not only for our country but also for international markets.

The gap between potential and actual yields is high in a majority of farming systems. In most of the crops, the present average yield is just one third of the achievable yield. Therefore, a massive effort is required to launch a new revolution in farming, through cost saving and efficient technologies both for production and post-harvest management.

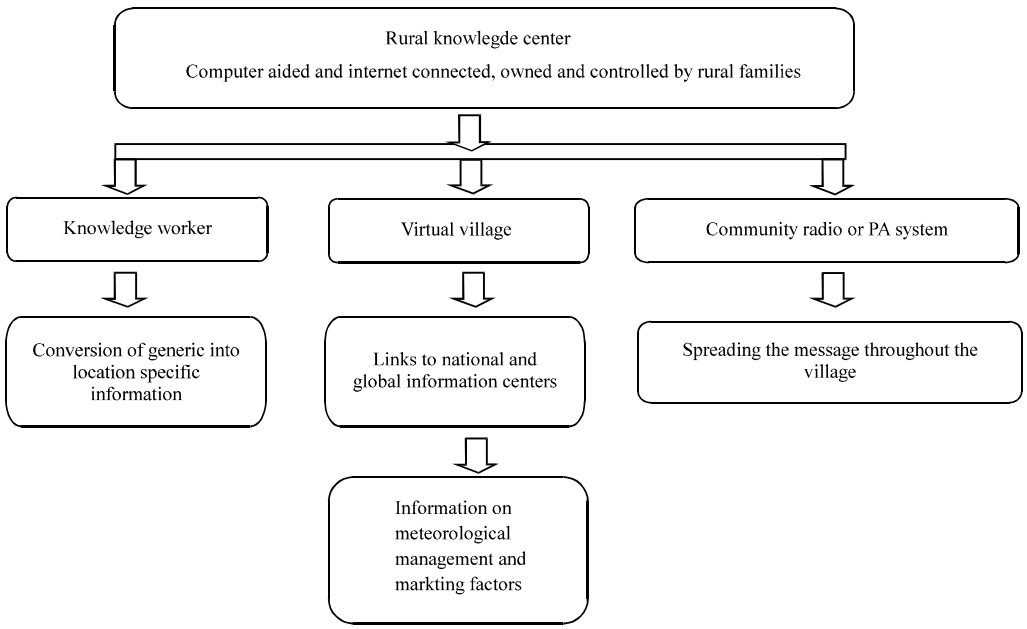
Institutional and infrastructural support is essential for higher agricultural production. There is an urgent need for providing efficient irrigation, power supply, rural roads, cold storages, godowns and food processing units supported by assured and remunerative marketing as developed by the successful dairy and marketing cooperatives.

Increasing rural income through recognition and reward to the past and ongoing contributions of farm families in improving, selecting and conserving crop genetic resources as envisaged in the Protection of Plant Varieties and Farmers Rights Bill, 2001 and increased agricultural exports. To increase agricultural exports we will need greater investment in post harvest technology and

infrastructure for meeting the requirements of sanitary and phyto sanitary measures, ISO 9000, 14000 and Codex Alimentations standards. For the success of the above strategies the country will require restructuring and retooling of extension services for an era of precision farming by establishing Rural Knowledge Centres and retraining of existing extension workers as Rural Knowledge Workers. The legacy of the past 50 years gives us confidence that our farm women and men will overcome difficulties and capitalize on opportunities and help the country to realize Gandhiji's vision of a hunger free India in the early part of this century.

Many of simple and cheaper technologies which have being repeatedly succeeded in laboratories which are need to be transferred from lab to land. The primitive microalgae people succeeded in developing economically feasible technologies such as remediation techniques and to most modern nanotechnological techniques and found use of microalgae in dye degradation, nanobiocomposite development, semiconductor development, biolabelling agents, antimicrobial agents and so on. These technologies not yet been transferred. The factors inhibiting the process of transferring technology is inadequate knowledge to the educationalist (MubarakAli *et al.*, 2008, 2011a, b, 2012, 2014).

National extension program: National Extension Programme in far off Northern, Southern, Eastern and Western parts of the country has been taken up by the Centre from Rabi 2007-08 in collaboration with selected SAUs/ICAR Institutes such as Marathwara Agricultural University, Parbhani and Mahatma Phule Krishi Vidyapeeth, Rahuri in Maharashtra, BHU, Varanasi, IIVR, Varanasi in Uttar Pradesh, MPUAT, Udaipur in Rajasthan and University of Agricultural Sciences Bangalore and Dharwad in Karnataka and Birla Agricultural University Ranchi in Jharkhand. A cluster of 2-4 villages is selected at each project site in different locations to carry out the project activities. The progressive farmers in project locations are also linked and utilized for technology transfer. Restructuring and retooling of extension service must adopt to according to the ICAR direction can able to transfer technology from lab-to-land (Fig. 1).



(Courtesy: Agriculture; chapter XXI; ICAR)

Fig. 1: Restructuring and retooling of extension service for dynamic extension education in India

Recent initiatives have been taken up to transfer agricultural technologies to remote areas of the country through partnership program between IARI and 25 NGOs of repute involved in agricultural activity from 16 states of the country. For speedy transfer of technological information to the farmers at mass level, Indian Agricultural Research Institute Pusa, New Delhi (IARI) in collaboration with All India Radio (AIR) New Delhi and Doordarshan (DD) New Delhi has taken up a new initiative as a model by organizing Akashwani Krishi Pathshala and Krishi darshan Pathshalas on different crops and their production technologies.

CONCLUSION

The overview of agricultural education institutions in developing countries will need to be addressed not only immediate production needs but also long-term food security, sustainable agriculture and rural development needs in the next century. This will require moving from a single-disciplinary approach to an inter-disciplinary approach which incorporates a wide range of new topics, including gender, environmental and population issues. A major challenge will be the transformation of agricultural education institutions into dynamic promoters of change within their environments. This will require that they abandon long-established traditions of academic isolation and become active contributors to sustainable agricultural and rural development through innovative teaching, research and extension.

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