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Do Knowledge Deficiency Factors Steer Agricultural Extension? Institutional Evidence from Red Lateritic Zone in India

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ABSTRACT: *The farming community is guided by the pattern of knowledge flow through informal, formal and non-formal mode of education for maintaining their livelihood whereas agricultural extension essentially incorporates these three with balanced share for target beneficiaries. Krishi Vigyan Kendra (KVK), a nationwide project under Indian Council of Agricultural Research (ICAR) is dedicated to agricultural extension at the grass roots farming system in India since 1974. The massive proliferation of KVKs i.e., more than 641 numbers, indicates its considerable impact in the Indian Agriculture system. The central objective of the organization is to empower village level farmers by providing all the necessary inputs through integration with possible government and non-government organizations. In spite of this immense effort it is fact that farmers are incapable to follow the updates of modern agricultural technologies. To capture the root cause of knowledge deficiency of farmers this study was conducted with the focus on Seva Bharati KVK, West Bengal under dry red lateritic zone in India alongwith adjacent areas through quantitative data collection and analysis of the same by Exploratory Factor Analysis (EFA) technique. The result identifies three significant factors leading to the knowledge gap between trainers and trainees.*

Keywords: *India or Indian agriculture, Knowledge deficiency, KVK, Technology transfer.*

INTRODUCTION

The development of Indian civilization started with rivers and nature; based on the characteristic of the nature the journey of economy of the country started with Agriculture, touching life of every national, and still this is the foundation of Indian economy [1-6]. Very recent emphasis is given towards the adoption of technology in agriculture practices to increase yield of crop production per hectare. Priority is given towards advanced agricultural technologies including, but not limited to, climate resilient agriculture, dryland agriculture/ farming, precision agriculture and farming, waste land reclamation and many other specific mode of agriculture practices with the continual variation of micro-climate. Among many countries, Israel is pioneer in successful application of drip and sprinkler irrigation technology to convert a desert into green-field. In India, Maharashtra state has successfully applied major drip system in cultivating sugarcane, fruits and other horticulture crops. Rapid adoption of digital technology in the field has accelerated this transformation. Digital technology implies the range of fast access and information and communication technology like internet, mobile, computer, remote sensing (RS), geographical information system (GIS) and global positioning system (GPS) which are coming very rapid to facilitate agriculture sector. The endeavour for modernization of agriculture was started in the Green Revolution period during sixties. Afterwards in 1974 the systematic and scientific agriculture was initiated by establishing the first KVK in the country in Podicherry. The journey of KVK reaches a considerable number, i.e., 641, according to ICAR database (Ref: *http://www.icar.org.in/en/krishi-vigyan-kendra.htm*). There are eight agro-climatic zones around the country. Based on the need of the area, potentialities and opportunities the particular KVK formulates its yearly plan.

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KVKs have been proliferated under ICAR, the apex body for agricultural research and extension [2-10]. KVKs are working with NGOs, agricultural universities, other related institutions and government line departments. Following are the different stakeholders in KVK activities (International Food Policy Research Institute: Review of Agricultural Extension in India): ATMA (Agricultural Technology Management Agency), CAU (Central Agricultural University), Farmers'/ Farm Science Club, Line departments of state governments, MANAGE (National Institute of Agricultural Extension Management), NABARD (National Bank for Agriculture and Rural Development), NARS (National Agricultural Research System), RKVY (National Agricultural Development Project), SAU (State Agricultural University). Such collaborative effort indicates that both government and community are accepting the importance of nationwide agricultural development and putting joint effort in the line of policy level and implementation level for the same. The concept is to transfer the knowledge from R&D institution to farmers' field with appropriate manner. This study was initiated from SBKVK under Jamboni Block, Paschim Medinipur, West Bengal, a resource crunch area under Jangalmahal with red-lateritic soil, undulated land and water crisis. Surrounding villages like Hatiasuli, Kapgari, Kenduasuli, Rakhalmara and others uphold the value of such organization. This was the first effort of village reconstruction immediately after independence of India from the concept of Tagore and Gandhi's philosophy in this region by Dr. Pabitra Kumar Sen, a renowned agriculturist and educator with the subsequent emergence of first Krishi Vigyan Kendra (KVK), agricultural science centre in 1976. SBKVK has been playing the role of technology backstopping to the farming communities in this area. This paper tries to scan the major factors behind the loopholes, if any, in KVK's training, knowledge dissemination and transfer process as the adoptability of the same does not appear to be at par by the farming community for their betterment.

LITERATURE REVIEW

During 1973 the ICAR Standing Committee on Agricultural Education felt that Krishi Vigyan Kendras (KVKs) could be of national importance which would help in accelerating the agricultural production resulting in improving the socio-economic conditions of the farming community [2-10]. The ICAR, therefore, constituted a committee in 1973 headed by Dr. Mohan Singh Mehta and worked out a detailed plan for implementing the scheme. The Committee submitted its report in 1974. With a good start the first Krishi Vigyan Kendra (KVK) in Pondicherry was established in 1974 (Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India). The Krishi Vigyan Kendra (KVK), or farm science centre, is a multidisciplinary educational institution situated at the district level, with funding and technical supervision from ICAR [5-9]. There are currently centres in 569 districts, almost one for each district in India. Each centre is under the administrative control of a state agricultural university, NGO, or central research institute. The performance of KVKs may vary depending on the administrative control. Each KVK is in one of 15 agro-climatic zones, and the zonal coordinator pays a visit to each of them every three months. Within each centre, around 20 scientists are employed from different disciplines including crop production, plant protection, agricultural engineering, and home science (Dash and Mishra, 2004). Each scientist is expected to carry out at least two frontline demonstrations and two farm testing demonstrations per year. A meeting of the scientific advisory committee is held once a year, with the attendance of the heads of the various government line departments, progressive farmers, and the zonal coordinator, at which the KVK action plan for the following year is discussed. The action plan is based on a Participatory Rural Appraisal (PRA) assessment, carried out by KVK staff. In this way, the needs of the farmers are incorporated into the action plan of the KVK. From KVKs inception in 1974 functioning first KVK in Pondicherry upto 11th Plan Period, Govt. of India has established total 630 KVKs while more have been started functioning [2, 3-4, 6-9]. The following figure explains the increased number of KVKs in different Plan Period (Fig. 1):

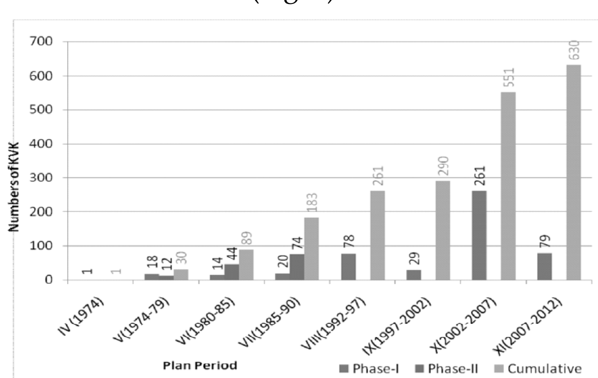

Figure 1: Proliferation of KVK's During Different Plan Periods

The main dimensions of the agriculture include crop cultivation, water management, fertilizer application, fertigation, pest management, harvesting, and post-harvest handling like food processing/ value addition with marketing which demands the intervention of experts like meteorologists, soil scientists, agricultural hydrologists, and agronomists. Sigman and Swanson (1984) conducted a study with the directors of national extension organizations in developing countries, viz., Asia, Africa, Latin America and Caribbean and Oceania regarding their views of issues which could affect agricultural extension (G.L. Ray, Extension Communication and Management). According to the importance of seriousness the problems are ranked based on 50 Extension Directors of the above countries (Table I):

Table I
Component-wise Ranking of Extension Problems

Rank	*Component*	*Problems*
1st	Mobility	Field-level extension personnel lack adequate transportation to reach farmers efficiently.
2nd	Extension training	Extension personnel lack training in extension methods and communication skills.
3rd	Equipment	Extension personnel lack essential teaching and communications equipment.
4th	Organizational	Extension personnel are assigned many other tasks besides extension work.
5th	Technical training	Field-level extension personnel lack practical agricultural training about improved technology.
6th	Teaching aids	Extension personnel lack essential teaching aids.
7th	Linkage	A continuing two-way flow of information between extension services and national agricultural research institutions is lacking.
8th	Technological	Appropriate technology is not available to extend to farmers.
9th	Other problems	Specific other problems identified by respondents.

Insufficient mobility and extension training were perceived to be very serious problems. Other problems like equipments, teaching aids, linkage etc. are very sensitive issues for agricultural extension. The organizational/ institutional problems are ranked in 4th whereas majority of the problems can be addressed by institution itself.

KVK plays a pivotal role for holistic support [3-8]. The key function of KVK is the extension education for farming community through on farm testing (OFT) and front line demonstration (FLD). Through these two mechanisms KVK tries to transfer a new technology or new farm machinery to the farmer's field. The entire education system is non-formal through training. For the purpose of channelizing different inputs to the end user KVK facilitates to form farmers'/ farm science clubs at the village level.

DATA COLLECTION AND METHODOLOGY

For quantitative data collection field survey was executed through close-ended questionnaire (instrument). Each items of the instrument was scored on the seven-point Likert scale that is ranging from 1 (Strongly Disagree) to 7(Strongly Agree). For this particular research the samples considered are the farmers, trainees and other participants attended in SBKVK trainings and Technology Week, Precision Farming Development Centre (PFDC), Agri-Expo'15 and Farmer's Meet-2015 in Agricultural and Food Engineering Department, IIT Kharagpur, Farmers Awareness programme organized by an NGO in Balasore, Orissa. Sample size was considered as 162. During the data collection process effort was to ensure the heterogeneity of the collected data.

RESULTS & ANALYSIS

A broad picture of deprivation prevails in Kapgari, Hatiasuli, Jhargram area; massive land laying fallow around SBKVK and Jangalmahal area. To address this issue SBKVK has been taken an initiative to form Farmers' Clubs at individual village level. A farmers' club or farm science club is an organized body of like-minded farmers in a village. The objective of a farmers' club is to joint cultivation by the particular group of farmers where an individual farmer does not have the capacity of farming. This is prevailing basically for small and marginal farmers occupying small and fragmented land in India. By forming a group they share their knowledge scientifically, distribute input logically, divide their all the other duties by mutual understanding. They are eligible for applying any financial and non-financial means. Thus they can enhance their productivity through capacity development. HBIFCFC (Hatiasuli Bengal Innovation Foundation & Cooperative Farmers' Club), a member of SAC (Scientific Advisory Committee) (Proceedings of the Meeting of the 11th Scientific Advisory Committee (SAC) of SBKVK, 25th March, 2015 and ANNUAL REPORT 2014) of SBKVK, is such a firm science club which has started its activity from village Hatiasuli with a different way by grooming and motivating the farmers. It has started its collaborative training process with IIT Kharagpur through PFDC (Precision Farming Development Centre) and other departments, mentored by renowned personalities and scientists. As a part of its success, last year it could convert a piece of dry and waste land into greenery. Youth from Hatiasuli and surrounding villages (mostly tribal dwelled) are getting confidence and showing their interest on participation. However, from all the sessions and subsequent interaction with the village people it was observed that considerable knowledge gaps are there during the training provided by KVK although it is observed that the maximum farmers' participation is in Kisan Mela but participation in Group Meetings is moderate which implies the community may be mostly interested in group activities. The pilot study provides an insight into the evaluation of the training provided by KVK. Further, EFA (Exploratory Factor Analysis) has been done to extract the major factor effecting technology adoption by farmers.

Evaluation of latent variables by Exploratory Factor Analysis (EFA)

There are many variables affecting technology adoption and transfer. The analysis of variables provides the value of Cronbach's Alpha as 0.950 which is more than 0.5; thus it is considered as acceptable. The KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy) value of the variables is 0.525 which is higher than the acceptable threshold, 0.05, and the significance value is 0.000. Therefore, the data are appropriate to perform factor analysis. According to communalities result ten variables were taken for factor analysis further. There are three factors extracted based on their respective eigenvalue. The extracted three factors have an eigenvalue greater than one and total variance explained. Finally, three factors have been taken after rotation of the component matrix in Varimax with Kaiser Normalization. Thus, three significant factors of technology adoption lag, i.e., Failure of TTT (technology transfer training) Comprehension, Failure of TTT Customization, Failure of TTT Generalization are extracted (TABLE II).

Finding of factor analysis revealed that there are three significant factors extracted. The first factor, i.e., Failure of TTT (technology transfer training) comprehension, reveals that the technology takers, i.e., farmers are suffering from comprehension of the technological knowledge explained by the experts. This may be due to language, method of training or other barrier. The second factor, i.e., Failure of TTT customization, expresses that the training for individual farmer, crop or season is not customized so that the farmer can easily adopt the technology and implement it; this can be considered from the farmers' (trainee) end. The third factor, i.e., Failure of TTT generalization, implies that either there are some incomplete policy measures or insufficient

Table II
Exploratory Factor Analysis (EFA)

Code	*Variables*	*Extracted Factors*
LIKG4	Language of trainer is not comprehensible	Failure of TTT* comprehension
LIKG8	I could not implement PFT after training	
LIKG9	I can't understand the technology even after training	
LIAK2	I can't get training on modern agro-equipments, soil science, water science and other inputs through a single window	Failure of TTT customization
LIAK5	I understand the technology but not ready to introduce very fast (not customized crop-wise)	
LIAK6	I believe due to high cost PFT does not appear to be interesting to farmers (non-customization leads to uncertain return)	
LIAK7	I get confused to adopt a technology when different technologies are proposed for the same cultivation	
LIAK4	I am not interested in PFT for any specific short-term benefit	Failure of TTT generalization
LIAK8	I lose my confidence to adopt a technology when same training is provided by different trainers	
LIKC6	Effect of changes in microclimate does not affect PFT	

*Technology transfer training

LIKG: Low intensity knowledge gain; LIAK: Low intensity of applicable knowledge
LIKC: Low intensity of knowledge for customization
Numbers like 4, 8, 9 associated to the code interprets the respective question number in the original questionnaire.

infrastructure, i.e., absence of common training methods for individual trainers, absence of similar training tools on training for different crops are not practiced; this may be considered from the KVK's (trainer) end. So, a training duality (customization-generalization) is prevailing throughout the process. The effect of such dualism in the training process generates confusion amongst farmers. This may lead to a knowledge deficiency in the farming community.

CONCLUSION

From this study it is obvious that for technology transfer to the agrarian community the way of presentation of technology and dissemination has a vital role where non-formal education through appropriate deployment of the institutional resources is a major driving force. A farmers sitting at remote villages throughout the country should be able to get best solutions to his farming problems by interacting with the system in most user friendly manner and in their own/comprehensible language. The necessary knowledge-base may be generated through a good resource allocation. In India KVK is providing good service to the farmers by siphoning all the inputs including technology. Farmers and farms are the backbone of any country since they can produce food, fuel (agricultural residues) and wealth from the land. They should be helped by all members of society and KVK must be able to lead a step ahead in the right direction to overcome the confusion and knowledge deficiency prevailing in the farming community.

LIMITATIONS AND FUTURE SCOPE

This study could not consider the actual time of generation of any specific technology. The heterogeneity of data may fortify the quality of the study.

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