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Production Orientation of KVK Adopted Farmers: The Socio-Ecological Estimation and Interpretation

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Authors' contributions

This work was carried out in collaboration with all authors. Author MM wrote the first draft of the manuscript, collected data and done statistical analysis. Authors AG, MH, SG and DM helped in collection of data and preparation of manuscript. Authors AB and SKA helped in interpretation and supervised the work. All authors read and approved the final manuscript.

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ABSTRACT

Krishi Vigyan Kendra was established initially to impart training to the different stakeholders of the farming community as a method of technology delivery system. As the time passed by this grass root institution has undergone a tremendous change, starting from technology generation, testing, verification and ultimately onwards transmission to the end users for the enhancement of the productivity in particular and for the overall socio- economic development of the rural people in general with its mandated programmes. The work was conducted with 10 independent variables and one dependent variable-.i.e. Production orientation (y). Purposive as well as simple random techniques were adopted for the study. Among 50 adopted KVK farmers of the selected villages only 22 adopted farmers have been randomly selected and more 22 non adopted farmers and thus altogether 44 farmers have been randomly selected for the study. The results revealed that adoption of improved and newer technology requires decision by farmers, and scientific orientation is a degree to which respondents can orient to the use of scientific methods in relation to adoption

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behavior. It is an important psychological factor in decision making process. It is concluded that people with progressive attitude will always try to involve themselves in all activities through which more annual income can be achieved and education plays a vital role for adoption process. Training plays important role for improvement of KVK. In the last phase of stepwise regression analysis it is seen that mechanization in family has got some functional impact on production orientation. Mechanization in family determines the adoption of new technology which increases farm production. So it is clear that KVK is an institutional project of ICAR to demonstrate the application of science and technology input of agricultural research and education in the farmers field in the rural areas.

Keywords: Adoption; farm mechanization; Krishi Vigyan Kendra; KVK mandates; technology transfer.

1. INTRODUCTION

Krishi Vigyan Kendra is an institutional project of ICAR to demonstrate the application of science and technology input of agricultural research and education in the farmers field in the rural areas. Krishi Vigyan Kendras-KVKs (Farm Science Centers) have been established by the Indian Council of Agricultural Research in 569 districts. The trust areas of KVKs are refinement and demonstration of technologies, and training of farmers and extension functionaries. Imparting vocational trainings in agriculture and allied fields for the rural youth is one of its mandates [1]. India is shifting from 'Agriculture for subsistence' to 'Agriculture for quality of life through income security.' Food security and nutritional security, the other issues are coming in a big way across the globe. In 2025, approximately 44 m. ha. of irrigated rice areas in Asia would face 'economic, water scarcity' (Expensive water), and additional 17 m. ha. may confront 'physical water crisis' (Dry up). Indian agriculture needs 'Inclusive growth' which includes social justice, equity, balanced growth and economic wellbeing of the farmers. There is a wide gap between scientific know-how and field levels do-how. Emphasis to be given on the demand driven production system to supply driven production system. Adoption of improved and newer technology requires decision by farmers. Scientific orientation is a degree to which respondent is oriented to the use of scientific methods in relation to adoption behavior. It is important psychological factor in decision making process. Innovations which is the main theme of KVK training, is the degree of an individual interest and desire to seek changes in farming techniques and to introduce each change into his own operations as and when found practicable and feasible. Present study revealed that out of nine independent variables, correlation coefficient has shown positive and significant relationship in case of variables namely, occupation, experience in farming, training received at KVK, scientific orientation and innovation while, non significant relationship in case of age education, size of land holding and animal possession with attitude of the farmers toward training organized by KVK. It is concluded that farmers with progressive attitude will always try to involve themselves in all activities through which more annual income can be achieved. Thus, such kinds of farmers are always optimistic and try to get maximum information and benefit from KVK trainings [2]. The overall annual income in the KVK's adopted villages was increased after taking the different schemes / programme implemented in both the districts and the overall incremental employment generates in man days per annum on KVK's adopted villages enhanced as compare to the non-adopted KVK's villages, even the impact of KVK's training / programme on their overall knowledge level was enhanced with 22.00 per cent, which was found to be positive and statistically significant at 5 per cent level [3]. Training is an organized activity aimed at imparting information and/or knowledge or skill there by improves the trainee performance. It is a learning process that involves the acquisition of knowledge, sharpening of skills, concepts, rules, or changing of attitudes and behaviors to enhance the performance of employees [4].

At present there are 716 KVKS in 739 districts. One of the main tasks of Krishi Vigyan Kendra is to provide and improve the level of knowledge of the trainees about the improved farm practices, because knowledge is cognitive component of individual's mind and plays an important role in covert as well as overt behavior and individuals with a greater knowledge of technical nature of improved practices would lead to a high adoption possibly

because knowledge is not inert. Krishi Vigyan Kendras (KVKs) act as a crucial player in technology assessment, refinement and demonstration. Technology adoption to be successful depends on successful technology assessment, refinement and demonstration. Hence, the role of KVKs is of paramount importance in the above processes [5]. Overall adoption quotients for different aspects of agricultural production practices were highly skewed towards beneficiary respondents [6]. Once knowledge is acquired and retained, it undergoes and produces changes in the thinking process and of mental alchemy.

In India 1650 dialects, 18 constitutionally approved languages and 10 Indic scripts are spoken. ICT provides a new opportunity build a confident, skilled Kisan Knowledge Management System (KKMS). 44 Agricultural Technology CD's in 15 regional languages have been released.KVK & SAU's were made eligible to apply for CRS (Community Radio Service) licenses and establish and run them indecently.

The growth of Indian agriculture is dependent on 118.9 million farm families cultivating 155.2 million hectares of land. It is impossible to reach such a huge number of farmers. The effective dissemination and transfer of appropriate technologies to needy farmers is very much essential for increasing agricultural production in the country. Technology Development (also called technology innovation) in agriculture/fishery is a process consisting of all the decision and activities which a scientist does from recognition of a need/ problem with planning, testing, conducting research, verification, testing and dissemination for adoption. During the same time, some problems on the technology might get back to the scientist for solution thus resulting in refinement of the same. Thus, technology development is a continuous process. The KVK scientists have to equip themselves for 'technology application' - a process which includes the above mentioned processes; thus contributing their part in the overall process of agricultural/fishery technology development [7]. The transfer of technology is an issue way forward for the KVK and the entire stakeholders involved are to upscale the interventions in terms of technologies considering vertical and horizontal spread [8]. Today KVK stands as a bridge between the research laboratories and the application of modern agricultural science in rural India through the technology development and delivery system.

1.1 Mandates of KVK

I) Conducting "On-farm Testing" (OFTs) for identifying technologies in terms of location specific sustainable land use system.
II) Organizing training to update the extension personnel with emerging advances in agricultural research on regular basis.
III) Organize short and long term vocational training course in agriculture and allied vocational for the farmers and rural youths with emphasis on "learning by doing" for higher production on farms and generating self employment.
IV) Organize frontline demonstration on various crops to generate production data and feedback information.

The Krishi Vigyan Kendras (KVK) is of national importance which would help in accelerating the agricultural production and also in improving the socio-economic conditions of the farming community [9]. The overall activities of the KVK is to perfectly synchronized with the research or technology generation system by linking with SAUs and others research organization and in technology delivery system the hierarchy would be ATMA, Basic District Level Interactive Extension Model (BDLIEM), Zonal Agricultural Research Station (ZARS) and KVK would be the main partners under the new model. Imparting training to farming community and more particularly to tribal people is very much essential and also important activities of Krishi Vigyan Kendra. The scientists of KVK should be knowledgeable, experienced, and cooperative and assume responsibility. Well-furnished training hall, residential accommodation, library and reading room facilities to be developed in KVK ensuring good learning environment in KVK to provide better training for the benefits of tribal people [10].

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training to farming community and more particularly to tribal people is very much essential and also important activities of Krishi Vigyan Kendra. The scientists of KVK should be knowledgeable, experienced, and cooperative and assume responsibility. Well-furnished training hall, residential accommodation, library and reading room facilities to be developed in KVK ensuring good learning environment in KVK to provide better training for the benefits of tribal people [10].

To fulfill the mandates of the KVK generally programme formulation is done on the basis of the recommendation of the Scientific Advisory Committee (SAC). The Committee meets twice in a year before kharif season and before rabi season. The opinion of the multistakeholders of the programme generally discussed, approved and finally become a document of the KVK activities or KVK programmes. Training provided by KVK helps resulted in the gain in knowledge and skill of farmers, adoption level, productivity, Economic condition, self-confidence, social recognition and materials possession [11]. One of the important mandates of the KVK is to impart training to the different stakeholders groups like practicing farmers (PF), vocational training for rural youth and rural women and village level extension workers. The methodology, duration and topic of the training generally decided on the basis of the intervention points of the mandated KVK programmes. Besides training there are other important mandates like 'On Farm Trial and 'Front line Demonstration. Krishi Vigyan Kendra is conducting vocational training programmes for rural youth with a view to equipping the technological skill and employment related to agriculture and allied sectors. Vocational training helps to correlate education with the source of living. It is an activity directed to identifying and developing human capabilities for a productive and satisfying working life [12].

In the present context impact assessment was done on the overall performances of KVK without considering the mandates of KVK.

The general objective of the study was performance of kalian KVK and the changes analysis form a system vision in Purulia district. The specific objectives of the study were to delineate general socio-ecological status of KVK adopted farmers, to estimate and interpret their production orientation in terms of a set of socio-ecological characters and to elicit an array of recommendation for escalating production orientation of KVK adopted farmers.

2. RESEARCH METHODOLOGY

The deliberation on the methodology has been made to understand to the concept, methods and techniques which utilized to design the study, collection of information, analysis of the data and interpretation of the findings for revelation of truths and formulation of theories. This present chapter deals with the method and a procedure used in the study and consists of eight main parts.

2.1 Locale of Research

Villages namely Hatuara and Birgiri of the Purulia II block of the Purulia district in West Bengal was selected for the study. The area had been selected for the study because of (a) KVK adopted this village as their operational area, (b) acquaintance with the local people as Meir as the local language and (c) provision of relevant information.

2.2 Sampling Techniques

Purposive as well as simple random sampling techniques were adopted for the study. For selection of state and district purposive sampling techniques was adopted because the area was ideal with respect to the problem, convenient for researcher and having the infrastructural facilities and in case of selection of block, villages and farmers or respondents simple random sampling technique was taken up.

Among 50 adopted KVK farmers of the selected villages only 22 adopted farmers have been randomly selected and more 22 non adopted farmers and thus altogether 44 farmers have been randomly selected for the study.

2.3 Pilot Study

Before taking up actual study a pilot study was conducted to understand the areas, it people, institutions, the KVK activities in the research area, on the Basis of situational and background information of respondents were collected during the period of pilot study. Total 50 respondents have been selected for the study.

2.4 Preparation of the Interview Schedule

On the basis of findings of pilot study a preliminary interview schedule was formed with the help of literature, discussion with the KVK functionaries and by the assistance of Chairman of Advisory Committee. The interview schedule

consisted of two major parts according to the specific objectives of the study.

2.5 Pre-Testing of Schedule

Before starting final data collection, entire schedule was pretested for elimination, addition and alternation with non-sample respondents of the study area.

2.6 Techniques of Field Data Collection

The total 44 KVK adopted and non-adopted farmers were personally interviewed during puja vacation and summer vacation. The items were asked in Bengali as well as English version in a simple term so that the members could understand easily. The entries were done in the schedule by student investigator himself at the time of interview.

2.7 Attributes and Their Measurement

After reviewing various literature related to the field of study and consultation with the respected chairman of Advisory Committee and other expert, a list of variables was prepared. On the basis of selected variables, a schedule was formed.

2.8 Independent Variables

2.8.1 Age(x_1)

Chronological age has been considered for the study.

2.8.2 Education(x_2)

The attribute education had been operationalished as the formal education, taken by the respondent in a particular social system. The education had been divided into seven categories that is illiterate, can read only, can read and write, primary, secondary, higher secondary, graduate and above. It had been measured with the help scale developed by Pareek and Trivedi (1964) scale is socio-economic status (rural) and the weightages had been given as Illiterate - (0), Can read only -(1), Can read and Tie-(2), Primary -(3), Secondary -(4), Higher Secondary (5), Graduate and Above –(6)

2.8.3 Family member(x_3)

The attribute family type had been operationalished as the family type of our rural system. The family type had been divided in to two categories of the social system at is up to 5 members and above 5 members. It had been measured with the help of development of Pareek and Trivedi (1964) scale is socio-economic status (rural) and the weightages had been given as upto 5 members - (1) and above 5 members - (2).

2.8.4 Size of Holding(x_4)

The attribute land holding had been operationalished as the land holding of the respondent in the social system. It had been measured with the scale developed by the Pareek and Trivedi (1964) and weightages as the no land, less than one acre, 1-5 acre, 5- 10 acre, 10-15 acre, 15-20 acre, more than 20 acre. Socio-economic status (rural) and the weightages had been given as No land -(0), less than one acre -(1), 1-5 acre -(2), 5-10 acre -(3), 10-15 acre -(4), 15-20 acre -(5), more than 20 acre -(6)

2.8.5 Farm Power(x_5)

The attribute farm power had been operationalished as the farm power of the respondent in the social system. It had been measured with the scale developed by the Pareek and Trivedi (1964) and weightages as the no drought animal, 1-2 drought animal, 3-4 drought animal, 5-6 drought animal or tractor or power tiller. Socio- economic status (rural) and the weightages had been given as no drought animal -(0), 1-2 drought animal -(2), 3-4 drought animal -(4), 5-6 drought animal -(6), power tiller or tractor or-(8).

2.8.6 No. of training in KVK(x_6)

Structured schedule was developed and score assigned to each respondent 1 mark for each training programme, without having any training programme score assigned 0.

2.8.7 Family income(x_7)

Structured schedule was developed to quantify the secondary occupation of the respondents. The family income had been further divided in to two categories of the social system that is income from farm source and income from off farm source. It had been measured with the help of development of Pareek and Trivedi (1964) scale is socio-economic status (rural) and the weightages had been given as income from farm source (1) and income from off farm source (2).

2.8.8 No. of school (x_8)

The attribute education had been operationalished as the formal education, taken by the respondent in a particular social system. The education had been divided into seven categories that is primary, secondary, higher secondary, graduate and above. It had been measured with the help sale developed by Pareek and Trivedi (1964) scale is socio-economic status (rural) and the weightages had been given as Primary - (1), Secondary -(2), Higher Secondary (3), Graduate and Above –(4).

2.8.9 Cropping intensity (x_9)

The attribute cropping intensity had been operationalished as the formal cropping, taken by the respondent in a particular social system. The cropping intensity had been divided into three categories that are kharif, ravi and pre- kharif. It had been measured with the help sale developed by Pareek and Trivedi (1964) scale is socio-economic status (rural) and the weightages had been given as Kharif (1), Rabi (2) and Pre- kharif (3).

2.8.10 Forest coverage (x_{10})

The attribute forest coverage had been operationalished as the formal cropping, taken by the respondent in a particular social system. It had been measured with the help sale developed by Pareek and Trivedi (1964) scale is socio-economic status (rural) and the weightages had been given as forest coverage.

2.9 Dependent Variables

2.9.1 Production orientation (y)

Structured schedule was developed and score assigned to each respondent on the basis of 5 point scale to the statement strongly agree (5), agree (4), undecided (3), disagree (2) and strongly disagree (1). Summation of total score obtained by a respondent was taken into account.

3. RESULTS AND DISCUSSION

3.1 Correlation Coefficient: Production Orientation (Y) and 10 Independent Variables for All Respondents

The correlation coefficient between the independent variables and production orientation (y) has been displayed in Table 1 in case of all the KVK adopted and non adopted respondents. Out of 10 independent variables age (x_1), education (x_2), no. of training in KVK (x_6), family income (x_7) are found to be significantly related with production orientation (y). Adoption of improved and newer technology requires decision by farmers, and scientific orientation is a degree to which respondents can oriented to the use of scientific methods in relation to adoption behavior. It is an important psychological factor in decision making process. It is concluded that people with progressive attitude will always try to involve themselves in all activities through which more annual income can be achieved and education plays a vital role for adoption process. Training plays important role for improvement of KVK. Training makes people more optimistic and provides maximum information about new technologies.

3.2 Multiple Regression Analysis: Production Orientation (Y)

Table 2 presents the Regression analysis; Production orientation (y) vs. 10 Causal variable (x_1-x_{10}). The full model on regression analysis depicts that, with the communication of 10 causal variables together; only 71.40% of the variance in Production orientation has been explained.

3.3 Stepwise Regression Analysis: Production Orientation(Y) Vs. 10 Causal Variables(X_1-X_{10})

Table 3, presents the stepwise regression analysis suggests that only one variable retained in the last step and has contributed 62.70% of the variable explained. Adoption of improved and newer technology requires decision by farmers, and scientific orientation is a degree to which respondents can orient to the use of scientific methods in relation to adoption behavior so, the role of family income in terms of function contribution of working farmers is fairly significant. Family income determines the adoption of new technology which increases farm production.

3.4 Path Analysis: Decomposition of Total Effect Into Direct, Indirect and Residual Effect: Production Orientation (Y) Vs. Exogenous Variables (X_1-X_{10})

Table 4 Present the Path analysis: decomposition of total effect direct, indirect and residual effect; Production orientation (y) vs. exogenous variable (x_1-x_{10}). Study revealed that the family income (x_7) has highest total effect as well as highest direct effect on production orientation. The variable age (x_1) has highest indirect effect on production orientation. The variable family income (x_7) has

Table 1. Correlation coefficient: Production orientation (y) and 10 independent variables for all respondents

Sl. no.	Independent Variables	'r' Value	Remarks
1	Age (x_1)	-.393	**
2	Education (x_2)	.364	**
3	Family members (x_3)	-.076	
4	Size of holding (x_4)	-.039	
5	Farm power (x_5)	.177	
6	No. of training in KVK (x_6)	.400	**
7	Family income(x_7)	.792	**
8	No. of school (x_8)	.177	
9	Cropping intensity (x_9)	.052	
10	Forest coverage (x_{10})	.228	

***Correlation is significant at the 0.01 level, *Correlation is significant at the 0.05 level*

Table 2. Multiple Regression Analysis: Production orientation (y) vs. 10 independent variables

Sl. no	Variables	Reg.Coef. B	S.E. B	Beta	t Value
1	Age (x_1)	.121	.252	.121	.481
2	Education (x_2)	.189	.242	.189	.781
3	Family members (x_3)	-.083	.101	-.083	-.826
4	Size of holding (x_4)	-.335	.140	-.335	-2.391
5	Farm power (x_5)	.307	.158	.307	1.945
6	No. of training in KVK (x_6)	.142	.259	.138	.549
7	Family income(x_7)	.685	.099	.685	6.919
8	No. of school (x_8)	.045	.146	.045	.305
9	Cropping intensity (x_9)	.039	.089	.039	.436
10	Forest coverage (x_{10})	.053	.144	.053	.368

R square: 71.40%
The standard error of the estimate: 0.599

Table 3. Stepwise Regression Analysis: Production orientation (y) Vs. 10 Causal Variables (x_1-x_{10})

Sl. no.	Variables	Reg.coef.B	S.E. B	Beta	t value
1	Family income (x_7)	.792	.088	.792	8.973

R square: 62.70%
The standard error of the estimate: 0.617

Table 4. Path Analysis: Decomposition of Total Effect into Direct, Indirect and Residual Effect: Production orientation (y) Vs. Exogenous Variables (x_1-x_{10})

Sl. no	Variables	Total Effect	Direct Effect	Indirect Effect	Highest Indirect Effect
1	Age (x_1)	-0.393	0.119	-0.512	**-0.225 (x_7)**
2	Education (x_2)	0.364	0.184	0.180	**0.177 (x_7)**
3	Family members (x_3)	-0.076	-0.083	0.007	0.082 (x_5)
4	Size of holding (x_4)	-0.039	-0.336	0.297	0.226 (x_5)
5	Farm power (x_5)	0.177	0.308	-0.131	-0.247 (x_4)
6	No. of training in KVK (x_6)	0.400	0.142	0.258	**0.206 (x_7)**
7	Family income (x_7)	**0.792**	**0.685**	0.107	0.072 (x_5)
8	No. of school (x_8)	0.177	0.045	0.132	**0.108 (x_7)**
9	Cropping intensity (x_9)	0.052	0.039	0.013	**0.016 (x_7)**
10	Forest coverage (x_{10})	0.228	0.052	0.176	**0.113 (x_7)**

Residual effect: 0.285

routed highest individual indirect effect as many as six exogenous variables. The path analysis depicts that 28.50 per cent variance in production orientation (y) cannot be explained.

3.5 Recommendation Based on Empirical Studies

I) Mechanization needs to be socialized further amongst small land holder through custom hiring centres for augmenting both income and harvest.
II) Training is the most critical inputs and, organizing more, diverse and need based training would provide a fillip to the enabling process.
III) Community based approach to farm operation and services shall generate high and sustaining effect amongst all stakeholders of KVKS.

4. CONCLUSION

The result of the impact study revealed that with the rapid changing scenario in Indian agriculture, the Krishi Vigyan Kendra has also changed its role and plays a pivotal role and has become a 'light house' in the application of modern agricultural science in rural India, aiming at technology assessment, refinement and frontline demonstration of the technology The rural clientele developed a positive and its dissemination through training of farmers and extension personnel. Attitude and strong orientation towards the KVK and they are benefitted with the 'bucketful technology' offered to them under varied socio and agro-economic milieu. Adoption of improved and newer technology requires decision by farmers, and scientific orientation is a degree to which respondents can oriented to the use of scientific methods in relation to adoption behavior. It is an important psychological factor in decision making process. It is concluded that people with progressive attitude will always try to involve themselves in all activities through which more annual income can be achieved and education plays a vital role for adoption process. Training plays important role for improvement of KVK. In the last phase of stepwise regression analysis it is seen that mechanization in family has got some functional impact on production orientation. Mechanization in family determines the adoption of new technology which increases farm production. Training makes people more optimistic and provides maximum information about new technologies. Productivity increases significantly barring one or two minor crops. The study further revealed that knowledge management through communication sources of Krishi Vigyan Kendra has a strong bearing on the KVK adopted beneficiaries rather than non-adopted beneficiaries. So, far as the management dimension is concern, human resource development through training, planning orientation, market orientation has got tremendous impact almost in every sphere of KVK activities.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

As per international standard informed and written participant consent has been collected and preserved by the authors.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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