Role of Institutional Extension Efforts in Spreading Grass Root Innovations: A Study of Ornamental Fish Culture in Kerala

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ABSTRACT

Institutional extension efforts can play a vital role in identifying and scaling up grass root innovations. This paper analyses the functional role played by Krishi Vigyan Kendra in Kozhikode (Calicut) district of Kerala in identifying, refining, standardizing and popularizing the grass root farmers innovations in ornamental fish culture. The study describes the extension services delivered and the strategies adopted for identifying appropriate technologies, refining them and scaling up the adoption of selected technologies through focused extension efforts and training during the period 2010-2014. Using primary data collected through personal interviews and focus group discussions from 120 trainees, the impact of extension interventions is quantified in terms of training outcomes, adoption rates, demand for training services of KVK, potential for income farm income generation, etc. The effectiveness of training programmes is measured using paired t test on pre-test and post test scores of trainees. The study recorded a significant increase in the knowledge level of trainees and about 80 per cent of the trainees started ornamental fish culture with elements of farmers innovations. The study also establishes the potential in leveraging the grass root level reach of institutions like KVK's for institutional delivery of extension services for identifying farmers innovations suited for the local conditions in all areas of agriculture and allied sectors. The study points out the need to strengthen grass root extension agencies like KVK to enhance their role in sustainable and inclusive technology development.

Keywords: *Ornamental fish culture; Grass root innovation; Training; Krishi Vigyan Kendra;*

Grass root innovations are not only central to the development of more efficient research and extension systems but also such developments underpin the wider process of technical and economic change (*Hall et al, 2000*). Public extension agencies like Krishi Vigyan Kendras with extensive grass root linkages can play a vital role as an institution in identifying and providing strategic assistance in scaling up appropriate technologies. Efficiency in use of resources available with the farmers can also be enhanced through better linkages between farmers and extension personnel (*Rathore et al., 2008*).

In this context, studies on role of extension efforts in scaling up farm level innovations need to be conducted to derive meaningful models for adoption across the country. This study focused on ornamental fish farming in Kerala, a state endowed with natural resources and climate suited for this enterprise. Ornamental fish culture, is fast gaining importance as an additional component for farm income generation in states like Kerala, where small size of operational holdings and low investment capacity hamper large scale agricultural enterprises. This is especially true in case of small holder producers who seek avenues for additional income for enhancing livelihood security. Trade in ornamental fishes registered robust growth in recent years and since mid-1980's, the value of international trade in exports of ornamentals has increased at an average growth rate of approximately 14 per cent per year (*Kailasam et al., 2015; Rani et al., 2014*). This has led to the emergence of ornamental fish culture as a farming activity with high economic incentives.

Though ornamental fish farming is perceived as a high investment venture involving sophisticated equipment's, there are several innovations which can make it a low investment venture suitable for small holder production systems. These innovations are outcomes from the farmers' efforts in addressing practical challenges faced in adoption of ornamental fish farming and search for ways in reducing cost of production. The role of institutional extension agencies in identifying, refining, standardizing and popularizing these innovations and the technologies arising out of them through farmer participatory technology refinement can help in wider adoption of the technology. With this backdrop, a study was conducted to examine the role of institutional extension services rendered by Krishi Vigyan Kendra in supporting farmer level grass root innovations in ornamental fish cultivation in Kerala.

METHODOLOGY

The study was conducted in the Krishi Vigyan Kendra of Kozhikode district, which was selected purposively to study its role in identifying, documenting, refining grass root level technologies in ornamental fish culture in the district. Descriptive tabular analysis is used for documenting the role played by KVK in these activities. The KVK has been organizing on-campus and off-campus trainings to farmers on ornamental fish culture techniques incorporating the grass root innovations of farmers. The impact of the training programme was measured using an indicator based approach across impact categories like training output, outcomes, economic impact and social impact. The technology dissemination efforts of the KVK for popularizing validated and refined technologies was studied using the data on trainings conducted in ornamental fisheries during the period 2010-11 to 2013-14. A total of 46 training programmes conducted during this period were analyzed. A random sample of 30 respondents was selected from the trainee farmers of each year. Thus data from a total of 120 farmer trainees were used for further analysis on training achievement effectiveness and outcomes. Apart from the distribution of scores attained in the knowledge test, training effectiveness was measured using paired sample t-test marks obtained in pre and post training evaluation. The effectiveness of different dimensions of the training programme was measured using the procedure followed by *Kulkarni and Nikhade (1996)*, where the sum of the rating scores of all respondents for a dimension was divided by the total score possible for that dimension.

RESULTS AND DISCUSSION

Role of KVK in innovation identification and documentation: The personnel from KVK, Kozhikode conducted several field visits to farmers practicing ornamental fish culture for resolving field problems during 2009-10. In course of these visits and other monitoring visits, they have recorded and documented many grass root innovations made by farmers. These innovations were targeted at utilizing the limited resources available in creative ways, reusing component and thereby enhancing efficiency. As a result, these solutions were found to be frugal and sustainable in the local context. The KVK, Kozhikode, as a provider of public institutional extension service played a significant role in scouting for grass root innovations, their scientific refinement and identifying specific innovations which could be popularized for wider adoption by ornamental fish farmers. This intervention has lead to lead to a farmer participatory development and availability of low investment techniques for ornamental fish culture.

The institution created an inventory of all innovations in ornamental fish culture during 2009-10 leveraging its grass root contacts with farmers and through extensive field visits among practising farmers for further verification of the innovations. An initial assessment of the documented innovations was made by experts in ornamental fisheries and six innovations with significant adoption potential were identified. These innovations identified by KVK and their respective innovation domains are presented in Table 1.

It can be seen that the innovations were mainly targeted for reducing cost of establishment and production cost. This holds significance for small holder producers, since lack of financial resources is often a serious constraint. The innovations help in reducing cost of ornamental fish culture unit and make it a viable option for many small and marginal farmers with limited financial resources.

Training programmes in ornamental fish culture: The details of the on-campus and off-campus training programmes on ornamental fish culture conducted by KVK during 2010-11 to 2013-14 are presented in Table 2. The identified innovations were refined and included

Table 1. Grass root innovations in ornamental fish culture identified for popularization

Innovation	Innovation domain	Benefit
Use of discarded plastic sheet for constructing pools	Infrastructure	Low cost pools
Modified pool lining method using bricks and nets	Infrastructure/ Pest control	To control entry of frogs snakes and dragon fly.
Use of Construction of pools with wooden planks and plastic sheets	Infrastructure	Can be used for fish culture on concrete roof tops
Drenching used engine oil on ground below the plastic sheets	Infrastructure /Pest control	Prevent rodents from damaging sheets.
Utilizing discarded refrigerator cases for fish culture	Infrastructure	Minimizes pool construction cost
Erecting breeding hapa along with feeding tray.	Production	Reduces feed wastage and keeps brooder fish healthy

Table 2. Details of training programmes conducted on ornamental fish culture by KVK

Year	No.	Male	Female	Total	Off-campus trainees (%)
2010-11	10 (5)	123(67)	128(59)	251(126)	50.2
2011-12	15(8)	463(183)	236(148)	699(331)	47.3
2012-13	14(10)	361(291)	147(129)	508(420)	82.7
2013-14	07(2)	137(54)	75(13)	212(67)	31.6
Total	46(25)	1084(595)	586(349)	1670(943)	56.5

Note: The figures in parenthesis indicate the number of off-campus trainings/participants

as components in the training programmes. It was seen that the share of off-campus trainings (25 trainings out of 46) was higher and similar trend was observed in case of trainees (56.5%). More than one third of the trainees were women (35.1%) clearly indicating the suitability and acceptability of the enterprise among women. The higher share of off-campus training also indicates that the KVK has taken the efforts to provide the trainings at locations more convenient to the target population.

The training effectiveness score obtained for major training dimensions is given in Table 3. The scores ranged from 67.1 to 85.3. The low score for utility of the teaching material provided in the training indicates a low propensity of the trainees to use reading material and highlights the importance of practical sessions. The training effectiveness scores for all the dimensions were greater than 67 indicating a highly effective training pedagogy followed by the institution. The change in distribution of trainees across various mark categories in pre and post evaluation stages clearly depict the extent of knowledge gain achieved through the training (Table 4). The paired t-test conducted on the pre-test and post test scores showed significant indicating the substantial gain in knowledge through training.

Table 3. Effectiveness of training programmes (TES)

Training dimension	TES
Content of the training programme	85.3
Expertise and knowledge of trainers	76.8
Effectiveness and practical utility of the programme	81.9
Motivation to start enterprise	77.3
Utility of the teaching materials provided in the training	67.1
Utility and relevance of the practical sessions	75.6

Impact of training programmes: The training programmes on ornamental fish culture were pronounced across various categories of impact indicators. The training programmes helped in skill development, creation of assets and employment generation for the trainee beneficiaries. Moderate to significant increase in income from the adoption of the enterprise was reported by nearly 60 per cent of the trainees whereas increase in expenditure to a similar magnitude was reported only by 34.9 per cent of the trainees. This could imply that the increased incomes have contributed to savings of the rural households which could enhance the income safety net available to these households. More than the economic impact, the social acceptance and recognition can have a greater say in the continued adoption of the transferred skill. In this case the social impact indicators like

Table 4. Change in knowledge level of the trainees (n=120)

Marks (%)	Knowledge level	No. of trainees during Pre-evaluation	No. of trainees at Post-evaluation stage
0-20	Unaware	42	0
21-40	Not good	39	0
41-60	Fair	29	4
61-80	Good	9	77
81-100	Very good	1	39
Average marks (%)		39.3	82.8

t- value calculated from pre-test and post-test scores = 20.03* Table value of t (probability = 0.01 and DF=119) = 2.61

* Significant at 1 per cent level of significance

Table 5. Impact of training programme

Category	Indicator	Description	Share(%)
Output	Skill development	New skill acquisition	81.6
	Creation of assets	Created of assets related to skill transferred	64.1
Outcomes	Adoption of skill acquired	Limited trial of skill acquired	70.8
		Complete adoption of skill learned	48.3
	Employment generation	Full time employment from skill learned	27.5
		Part time employment from skill learned	45.8
	Continued adoption of skill	Enterprise in operation one year after training	62.5
Economic Impact	Change in annual income	Moderate increase in income	37.5
		Significant increase in income	21.6
	Change in expenditure	Moderate increase in expenditure	24.1
		Significant increase in expenditure	10.8
Social impact	House hold self sufficiency	Skill learned increased self-sufficiency of household	71.6
	Sharing knowledge and skill sharing	Shared knowledge and skill learned with other farmers	63.3
	Increased social recognition/status	Increase in social recognition	40.8
	Increased level of confidence	Increase in level of confidence	43.3
	Increased standard of living	Increase in standard of living	21.6

increased social recognition and increased level of confidence was reported by more than 40 per cent of the trainees. This indicates a low probability for technology discontinuance. The fact that 63.3 per cent of the trainees reported sharing of the acquired skills with other farmers also points to the spread effects of the training programmes conducted in the district. Similar diverse impact categories were reported by *Sarma et al., (2011)* in rice-fish farming training programmes.

The KVK also played a significant role in acting as a linkage point between various development agencies, public institutions and organizations in motivating entrepreneurship development and facilitating institutional support. Seven commercial ventures with assistance from other development agencies and institutions have been reported from the trainees selected for the study. The KVK was able to channelize the support of agencies like NABARD, Marine Products Export Development Agency (MPEDA), State Fisheries Department and state poverty alleviation mission for the trainee beneficiaries.

CONCLUSION

This paper examined the role of institutional extension efforts provided by the KVK at the grass root level, which lead to the development of low cost technologies for ornamental fish culture and the broad outcomes from the efforts for popularizing these technologies in a structured manner. The knowledge and adoption of grass root innovations arising out of accumulated wisdom, resource constraints, adverse situations etc. tend to remain localized without its proper documentation, scientific validation and focused extension efforts. The study clearly brings out the

positive impact in expanding the domain of application of such innovations, process or technology when institutions like KVK focus their efforts on provision of services to grass root innovators.

The KVK in this study leveraged the growing demand for freshwater ornamental fishes and their reach at the grass root level to scout, document, validate and popularize grass root innovations in ornamental fish culture. This gave many small holder producers, an opportunity to start entrepreneurial ventures in this field utilizing the ambient environmental condition, institutional support and sustainable low investment technologies. The innovations and technologies developed through farmer participatory approach found better acceptance among the trainees during technology transfer process. The low investment requirement and easy availability of the material inputs for technology adoption enhanced the adoption rates even among the resource poor farmers. The low level of initial investment requirement also facilitated trial of the technology at a limited scale and further scaling up after gaining confidence in the technology. The facilitation of linkages between institutional agencies and the farmers interested in entrepreneurship, which was done by the KVK, was critical at this stage. The outcomes of the training programmes conducted by the KVK in ornamental fisheries played a significant role in spread and adoption of the technology. The results from the study of training effectiveness and impact indicators of the training programmes substantiate this conclusion.

This study on the role taken by the institutional extension agency like KVK for identifying, refining and spreading grass root innovations in ornamental fish culture serves as an excellent model for grass root innovations in other area of agriculture. A similar decentralized extension approach was also suggested by *Pant and Singh (2014)*. These efforts are also a step towards acknowledging the latent pool of knowledge vested within local communities and grass root innovators, including them in the development process, and building upon their knowledge for inclusive sustainable development. The grass root institutions like KVK need to be further strengthened to enhance their effectiveness in such roles which can help in effecting more sustainable and inclusive technology development across various agricultural enterprises.

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