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Proficiency Enhancement of KVK-Scientists: Illustrating the Capacity Development Needs in Andhra Pradesh and Tamil Nadu

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Abstract

Krishi Vigyan Kendras (KVK) provide a basket of extension and advisory services and act as bridge between research and extension systems at the district level. The present study assessed the information and training needs of 62 SMS of the KVKs in Andhra Pradesh and Tamil Nadu through an online survey. Training needs were collected in a three-point continuum scale and ranked using the Weighted Sum Method (WSM). The majority of the respondents were men and belonged to the age group of <35 years, and possessed a PhD (58%), of which 19% had specialisation in fisheries. About three-fifth of SMS spent significant and adequate time on extension work (61%), perceived the available budget to be adequate (58%), and infrastructure to be inadequate (76%). Reportedly, interaction with colleagues (53%) and digital media (51%) are the primary sources of technical information, and 71% expressed the need for the development of user-friendly technical material to aid in extension work. Recent Technologies in Aquaculture (14.67) and Success story documentation (9.33) were the most preferred topics of training by the SMS of Tamil Nadu and Andhra Pradesh, respectively. Spearman's correlation showed no significant association between training needs of the SMS and their profile variables as well as the perceived organisational climate. Most SMS preferred offline trainings (60%) with a preferred duration of 5-7 days (45%) and a fee structure of Rs. 2500 (52%). Attention of the KVK administrators (ICAR-ATARI and SAUs) and KVK Coordinators are drawn to the findings of the study to design tailored competency enhancement programs for SMS make them deliver extension service, especially in the field of fisheries and aquaculture, more effectively.

Keywords:
KVK, SMS, Tamil Nadu, Andhra Pradesh, Training Need Assessment

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Introduction

Education, research and extension are serving as cornerstones for the development of agriculture and allied sectors in the country and had gone through meticulous changes over the years. The key drivers to attain food security in the country are the innovations and diffusion of new technologies (Medhi et al, 2017). Appropriate training and timely transfer of innovations from the research stations to the fishers/ fish farmers and other extension functionaries play a crucial role in improving the living standard of rural people by increasing their income.

KVKs are grassroot level organizations meant for the application of technology through assessment, refinement, and demonstration of proven technologies under different 'micro-farming' situations in a district (Das, 2007). To fulfil the mandates, KVKs conduct On-Farm Trial (OFT) and Front-Line Demonstrations (FLD) for evaluating and demonstrating the suitability of new technologies under different micro-locations, and conduct on-campus and off-campus training programs for disseminating the new research findings/technologies to

the farmers and extension functionaries. Recent studies on KVKs revealed that returns on investments in KVKs have brought rich development dividends in agriculture in terms of increasing production and productivity as well as household income by more than two folds (IFPRI, 2019).

The achievement of KVKs in both mandated and associated activities greatly depends on deployed workforce. The Subject Matter Specialists (SMS), also called farm scientists, are the resource persons in a KVK for agricultural knowledge management and information or experience sharing with the farming community. SMS of the KVKs must be competent to perform multidimensional tasks and improve their work effectiveness, which would make the Indian frontline extension system more visible, vibrant, demand-driven and client-oriented (Patil and Kokate, 2011). Need based training on various themes should be provided for the KVK personnel to enhance their expertise (Venkattakumar et al, 2015). To impart specific skills for performing activities in a better and more informed manner, training remains as a crucial instrument. Emphasis should be given to the training need assessment, as the training needs of SMS change with time and changing trends of agricultural and allied sectors (Augustine *et al*, 2020). In this context, present study aimed to assess the fisheries related training and information needs of KVK SMS and its relationship with their general profile and perceived organisational climate.

Materials and Methods

There were 53 KVKs (23 in Andhra Pradesh and 30 in Tamil Nadu) functioning in the states of Andhra Pradesh and Tamil Nadu as of January 2022, and the

Table 1: Variables selected for the study

Variables	***Definition / Description for Measurement***
A. General Profile of KVK-SMS	
Age	*Chronological age (number of years) of the respondent KVK-SMS*
Gender	*The sex of the respondent KVK-SMS (male and female)*
Educational Qualification	*Highest level of formal education successfully completed by the respondent KVK-SMS*
Area of Specialization	*Discipline/area in which the respondent KVK-SMS completed his/her Masters/ PhD degree*
Service Length	*Job experience or the service tenure measured as no. of years from the date of joining the KVK*
B. Organisational Climate	
Time Spent on different activities	*Percentage of time spent by the SMS on administrative works; conduct of OFTs, FLDs and other extension activities; interaction with researchers; and developing extension literature*
Infrastructure	*Availability of fisheries related infrastructure/facilities like ponds, fisheries demonstration unit, hatchery, IFS, processing unit etc. in each KVK*
Budget	*Budget available for operational expenditure; and the adequacy of budget as perceived by KVK-SMS to perform mandated activities*
Job Satisfaction	*Level of job satisfaction perceived by KVK-SMS (Satisfied to a great extent, partially satisfied, and unsatisfied)*
C. Information and Training Needs of KVK-SMS	
Information Sources	*Major primary / secondary / tertiary sources of technical information related to fisheries (interaction with colleagues, ICAR/CoF Scientists, Print media, Social media, and the Internet)*
Extension Literature	*Presence of technical material (Training manuals, leaflets, pamphlets, research articles) for conducting fisheries related OFTs, FLDs and Trainings* *Demand for extension literature as perceived by KVK-SMS*
Linkages with other Institutions	*Frequency of collaborating and networking with Fisheries Department, State Fisheries Universities, Research stations, Fisheries CBOs, Aquaculture industry, NGOs and other stakeholders working in the district*
Social Media Usage	*Frequency of using different social media application (Facebook, WhatsApp, You-tube, Instagram) by the respondent to connect with the farmers for disseminating knowledge and improved farm practices*
Training Exposure	*Number of skill development/training programs undergone by a respondent between the year 2019 to 2022*
Training Needs	*Felt need/desire/requirement to undergo training in the specified areas (to enhance one's knowledge, skill and attitude that can enable them to perform their job better)* *Preferred mode (online/offline/hybrid mode), duration and fee structure for attending skill/capacity development programs*

study covered all of them. An Ex-post facto research method was adopted, and there was no sampling involved as the entire universe, i.e. all the 251 KVK-SMS in position in 56 KVKs, were the target respondents. The study was conducted in collaboration with and support of ICAR-Agricultural Technology Assessment and Research Institute (ATARI) Zone X, Hyderabad, under whose jurisdiction these 53 KVKs in two states function. A pre-tested semi-structured questionnaire was built into an online survey using a customized Google form and used for data collection from KVK-SMS. Of the 251 SMS, 62 responses (29 from Andhra Pradesh and 33 from Tamil Nadu) were received. It was ensured that a minimum of one response from each KVK in the study states was collected. Some missing information and required additional information were also collected through phone calls to SMS and KVK Coordinators.

Descriptive statistical tools such as percentage analysis had been employed for the analysis of data obtained. Mann-Whitney U-test was used to test the significant difference between the two states in terms of budget and infrastructure availability to KVK-SMS, job satisfaction, availability of extension literature, and skill development programmes attended by the SMS.

$$U_1 = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1 \qquad U_2 = n_1 n_2 + \frac{n_2(n_2+1)}{2} - R_2$$

Where,

U = Mann-Whitney U test

n1 and n2 = Size of sample 1 and sample 2,

R1 and R2 = Adjusted rank-sum for sample 1 and sample 2

Fourteen thematic areas, grouped under general competency and fisheries specific competency programs, were selected based on the literature review, discussions with state extension functionaries, KVK staff and the author's expertise to assess the training needs of the KVK-SMS. The results were recorded in a three-point continuum scale namely, Most Preferred (MP), Preferred (P), Least Preferred (LP) by assigning scores of 3,2,1 respectively. Results were calculated based on the Weighted Sum Method (WSM).

$$\text{WSM Score} = \frac{(\text{No.of. MP} \times 3) + (\text{No.of. P} \times 2) + (\text{No.of. LP} \times 2)}{\text{Total No. of. MP+P+LP}}$$

Spearman's correlation test statistics was employed to check the correlation between the general profile, organisational climate and their perceived training needs.

$$r = 1 - \frac{\sigma \sum d2}{n(n2-1)}$$

Where,

r = coefficient of correlation

d = differences of ranks between paired samples

n = no. of pairs of observation

Results and discussion

Profile of KVK-SMS

Age: A significant 42% of SMS were young, under the age of 35 in the study states. Additionally, 37% of respondents were aged between 36 and 45, while 21% were over the age of 45. The mean and standard deviation was calculated as 38.44 and 7.89 respectively. Augustine *et al*. (2020) reported that 75.60 % of the KVK-SMS of Manipur belonged to middle age (36-55 years), while Dey *et al.* (2023) found that a similar (42%) proportion of SMS in the KVKs of West Bengal and Bihar were <32 years. Youthful age profile of SMS augurs well for the active role of KVK while underscoring the importance of mentoring and guidance by the KVK Program Coordinators.

Gender: KVKs continue to have larger proportion of men as SMS, though the participation of women is showing increase in some states, if not all. Here, three-fourth of the respondent SMS were men, with the proportion being 69% in Andhra Pradesh and 64% in Tamil Nadu. This finding is in conformity with the study conducted by Kumar *et al*. (2015) which reported a male to female SMS ratio of 83.87% in Haryana, 66.67% in Himachal Pradesh and 50% in Punjab. A recent study by Bhat *et al* (2023) found that 82.98% and 60% of the SMS were men in the states of Haryana and Punjab respectively, indicating no appreciable change.

Educational qualification and specialisation: Approximately 58% of the SMS who participated in the survey were Ph.D. holders. In Andhra Pradesh, the majority of respondents (52%) had a Master's degree as their highest educational qualification, whereas in Tamil Nadu, 67% of respondents held a Ph.D. Since the study primarily focused on fisheries-related training needs, a significant proportion of the SMS (19%) had specialized in Fisheries Science. This was followed by specializations in Animal Science (16%) and Horticulture (15%), as illustrated in Fig. 1.

Experience: About 53% of the respondents possessed experience of less than 5 years while 24% and 23% of the respondents had work experience of 6 to 10 years and more than ten years respectively, reflecting the relatively young age profile of SMS (Fig. 2). Likewise, Ramannanavar *et al.* (2019) stated that majority of the KVK-SMS in Karnataka (83.30%) had less than 10 years of work experience.

Organisational Climate

Time spent on different activities by KVK-SMS: Majority of the respondents (61%) stated that they spent most of their time on extension work which is evident from the Fig. 3. This is a positive and encouraging outcome. About 23% of the time was spent on administrative work and 16% spent on interacting with researchers for knowledge and skill updation. So, it could be discerned that the SMS were not being burdened with administrative work in

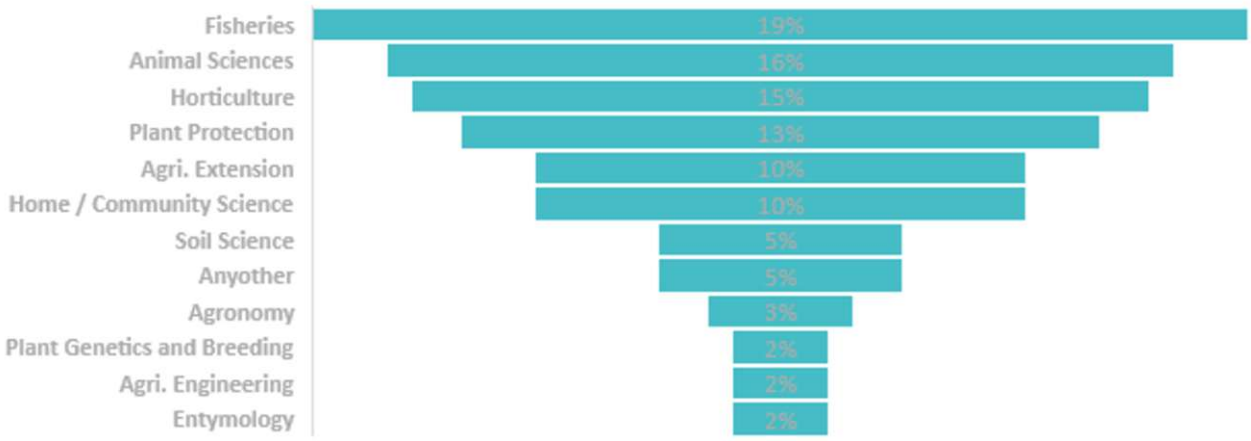

Fig. 1 Specialisation of SMS in various discipline (N=62)

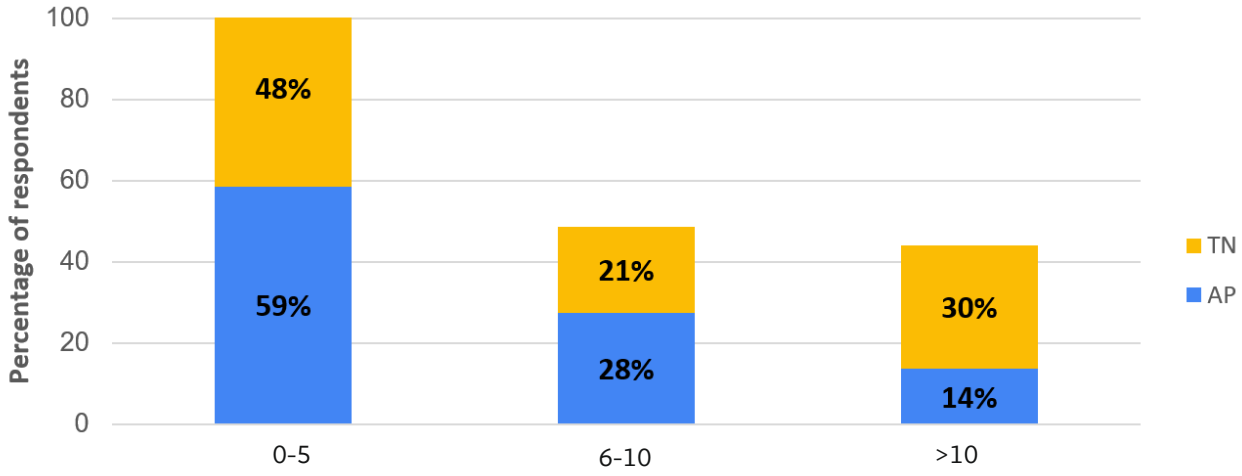

Fig. 2 Work Experience of KVK SMS (N=62)

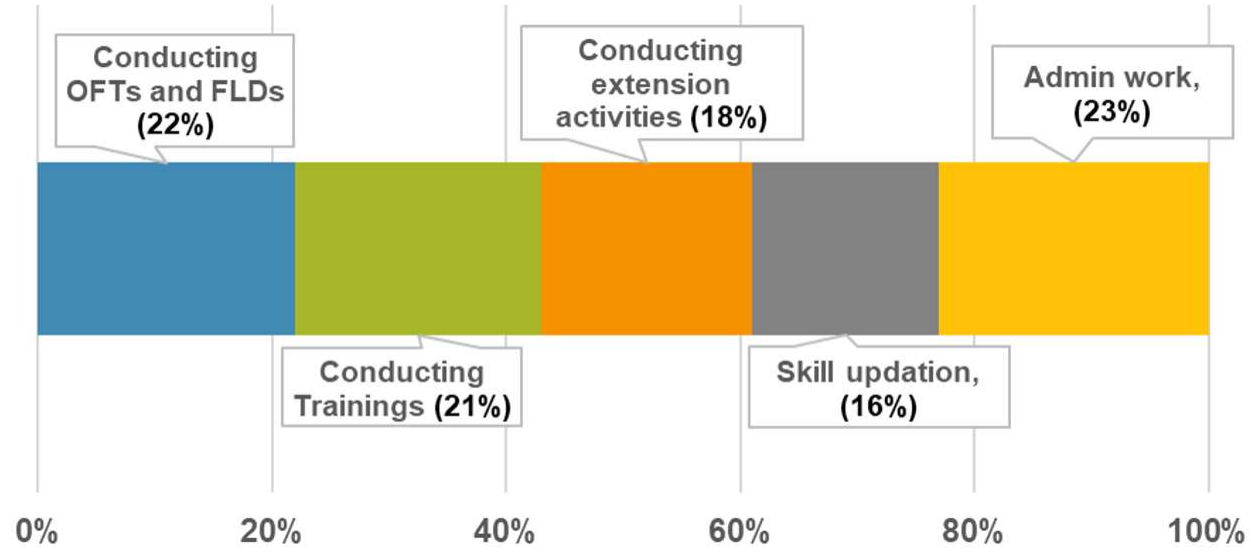

Fig. 3 Time spent on different activities by KVK SMS (N=62)

general and they appeared to have adequate time for conducting OFTs, FLDs, training and other extension programs.

Adequacy of fisheries infrastructure: Only one-fourth of the KVK-SMS who responded to the online survey felt that infrastructure (like pond, demonstration unit, processing unit, ornamental fish rearing unit, soil & water testing lab, hatchery, seed rearing unit, etc.) were available in KVKs to conduct fisheries related training/ OFT/ FLD programs which is depicted in the fig. 4. Results of Mann-Whitney U-test statistics (p value of 0.028 at 0.05 level of significance) showed that there was a significant difference between the two states in terms of perceived availability of fisheries-related infrastructure, with KVKs in TN perceived to be relatively better off as compared to those in AP.

Adequacy of budget: Majority of the respondents (58%) opined that adequate budget was available with KVKs for performing their mandated activities and conducting extension services satisfactorily while 42% of them reported the non-availability of adequate budget. Results of Mann-Whitney U-test statistics (p value of 0.214 at 0.05 level of significance) showed that there was no significant difference between the two states in terms of budget availability for extension work. However, Dey et al. (2023) reported that the KVK-SMS in Bihar and West Bengal perceived that the available budget was inadequate to perform the mandated activities.

Overall job satisfaction: Most of the respondents (56%) reported that they were satisfied to great extent with their present working condition whereas

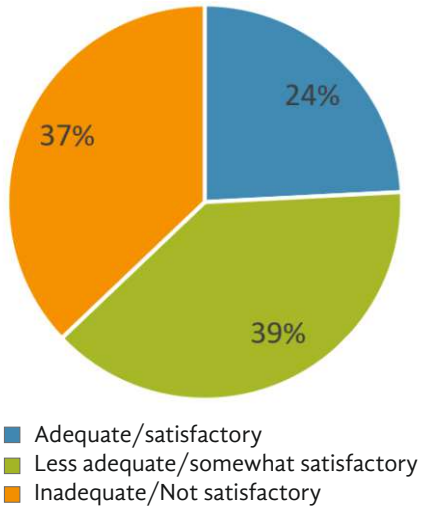

Fig. 4. Adequacy of fisheries infrastructure (N=62)

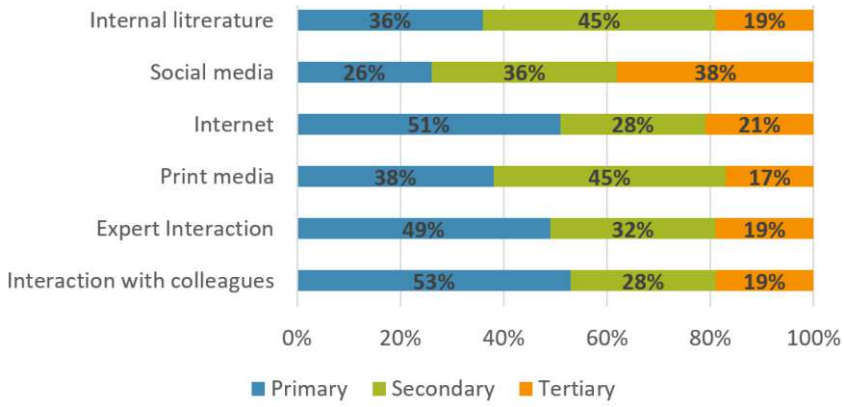

Fig. 5 Sources of technical information (N=62)

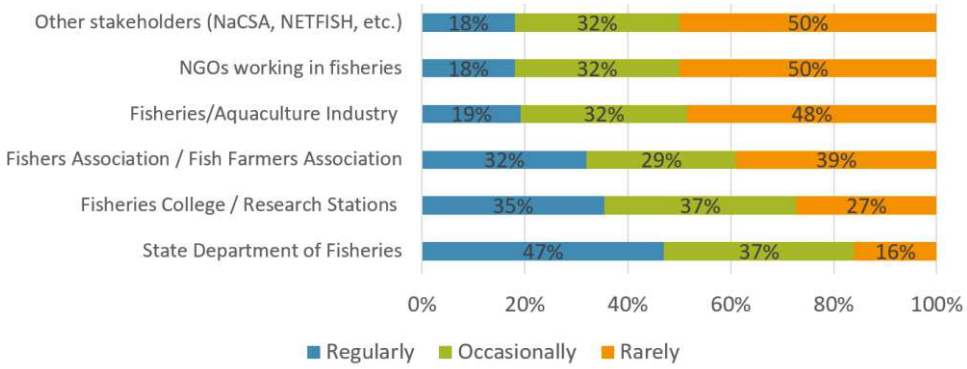

Fig. 6 Linkages with development agencies (N=62)

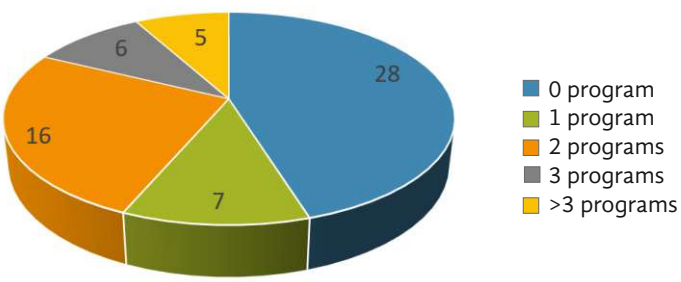

Fig. 7 Skill development program attended by SMS

42% of them are only partially satisfied and only 2% are unsatisfied. The finding is in line with the study by Augustine *et al*. (2020) where job satisfaction was assessed and found the most as satisfied (91%).

Information and Training needs of KVK-SMS

Source of technical information related to fisheries: It is evident from fig. 5 that KVK SMS source their information from multiple sources though gives differential time and importance to the primacy of each source. Interaction with colleagues (53%) and digital media (51%) were the primary sources of technical information related to fisheries/aquaculture for most of the respondents. This is closely followed by interaction with ICAR or CoF experts (49%). It was evident that internal literature developed and circulated by KVKs were rather limited (36%). Majority of the respondents have indicated print media (45%), internal literature developed and distributed by KVKs (45%) and social media (38%) as their secondary information source. Social media is increasingly emerging as a key source of information for younger Subject Matter Specialists (SMS), reflecting their preference for accessible and dynamic platforms.

Availability of extension literature: Majority of the respondents (60%) reported the availability of necessary technical / extension literature on fisheries/aquaculture in a user-friendly and readily accessible form, which is a positive outcome. However, 40% of the respondents highlighted the non-availability of such literature, indicating a concern that requires attention. Results of Mann-Whitney U-test statistics (p-value of 0.01) at 0.05 level of significance showed a significant difference between the two states in terms of the development of extension materials as SMS in Tamil Nadu reported better availability.

Demand for extension literature: Majority of the respondents (71%) expressed the need for ICAR-Fisheries Research Institutes (FRI)/Fisheries Colleges to prepare user-friendly extension/technical material (text, audio, video, success stories, etc.) and felt that would benefit KVK SMS and farmers. Though only 22% of the SMS suggested for co-development of extension material jointly by ICAR-FRI/CoF and KVKs shall be considered seriously and tried on a pilot basis to begin with.

Linkages with development agencies: Nearly half of the respondents reported that that they were regularly collaborating and working closely with the state dept. of fisheries (47%) while one third of them reported having close linkages with fisheries college or research stations or fishers / fish farmers association present in same or neighbouring districts (Fig. 6). This present finding gained support from the finding of Bashir et al. (2016), where the SMS had excellent linkage with Agriculture Dept. (43%) and Agricultural Universities (37%).

Social media usage: The primary survey revealed that the majority (60%) of the SMS in AP and TN were active social media users and were reported to connect with farmers through social media, while the rest 40% were also active but use it only occasionally to connect with farmers. This indicates the potential and feasibility of harnessing the digital social media tools to reach out to the hitherto unreached more effectively speeding up the process of development. The approaches and practices of delivering extension services are consistently evolving and the usage of social media can be helpful to reach out to the farmers constantly and SMS should be encouraged to use social media to connect with farmers. Nongtdu et al. (2012) found that even though the SMS in Meghalaya had moderate levels of exposure mass media like radio, TV, journals, magazine etc., they could not utilize them effectively due to time constraints and lack of interest.

Skill development program attended by KVK-SMS: SMS of the KVKs must be competent to perform multidimensional tasks and improve their work effectiveness. In this context attending a capacity building and skill development program is crucial for KVK SMS. Fig. 7 represents that 55% of the respondents attended at least one skill development program while the rest 45% did not attend any skill development program during 2019-20 to 2019-22. It is recommended that the KVKs should arrange skill development programs for SMS for improving their performance. Similarly, Paul et al. (2016) argued that self-updating and self-development programs for harnessing the optimum individual performance of the SMSs require immediate action to enhance the overall functioning of the KVK system.

Training areas preferred by KVK-SMS: Table 2 reveals that, out of 14 areas, SMS in Tamil Nadu preferred to be trained on Recent Technologies in Aquaculture (WSM score 14.67), followed by Fish Nutrition and Feed Technology (WSM score 14) and Project Management / Monitoring & Evaluation (WSM score 12.5). Success story documentation (WSM score 9.33), Entrepreneurship Development (WSM score 9.17), and Conducting PRA/RRA with farmers/fishers (WSM score 8.83) were mostly preferred by the SMS in Andhra Pradesh. The above finding reveals a considerable difference in the training needs of SMS in the KVKs of the two states underscoring the necessity and utility of developing customized programs based on need assessment. A comparative analysis of training needs assessments conducted by Dey et al. (2023) and Bhat et al. (2024) revealed regional preferences among Subject Matter Specialists (SMS). Specifically, SMS in Bihar and West Bengal exhibited a strong inclination towards entrepreneurship development training, whereas those in Punjab and Haryana favored training programs focused on Better Management Practices (BMP) and Good Aquaculture Practices (GAP). These findings align with the results of the present study, underscoring the importance of regional considerations in designing a training program.

Interestingly, the results of Spearman's correlation test statistics showed no significant correlation between

Table 2: Preferred Training areas of KVK-SMS

Training Need Areas	Tamil Nadu		Andhra Pradesh	
	WSM Score	Rank	WSM Score	Rank
Recent Technologies in Aquaculture	14.67	1	8.67	4
Fish Nutrition and Feed Technology	14.00	2	7.50	6
Project Management / Monitoring & Evaluation	12.50	3	8.50	5
Extension Management / Human Resource Management	12.00	4	7.00	7
Gender dimension and mainstreaming	11.50	5	7.50	6
Fish Breeding and Seed Production / Seed Rearing	11.33	5	7.67	5
Success story documentation	11.17	5	9.33	1
Entrepreneurship Development	11.17	5	9.17	2
Fish Health Management	9.67	6	8.33	4
Best Management Practices / Good Aquaculture Practices	9.00	7	8.50	4
Ornamental Fish Rearing / Aquarium Management	8.50	8	7.33	8
Conservation of Fisheries Resources	8.50	8	6.00	9
Conducting PRA/RRA with farmers/fishers	8.00	9	8.83	3
Fisheries Marketing / Value Addition	6.83	10	8.50	4

**WSM (Weighted Sum Method) score can range from a theoretical minimum of 4.83 (AP) and 5.5 (TN) to a theoretical maximum of 14.5 (AP) and 16.5 (TN), given N=62 and the responses were sought on a 3-point scale*

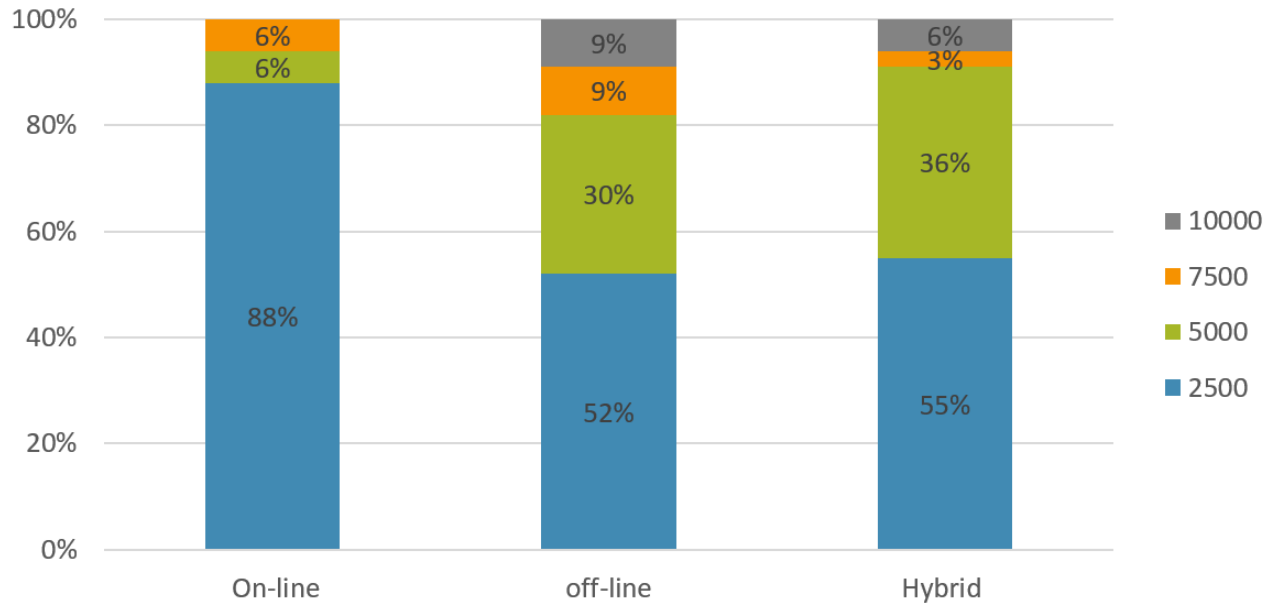

Fig. 8 Fee structure preferred by KVK-SMS (N=62)

training need on one hand and the variables like age, gender, educational level, service length, job satisfaction, training exposure, mass media exposure, availability of budget and fisheries-related infrastructure on the other. One can reasonably infer that these variables need not be considered while prioritising the training areas, at least for these two states. As the training needs of SMSs change over time, a training needs assessment should be carried out regularly. These findings are contradictory to the findings of the study conducted by Kalita (1992) that the training needs of village level workers in Assam have a significant correlation with age, and training exposure. Also, Sharma (1995) reported that characteristics namely, age, service experience of village level extension workers of Assam had a significant correlation with the extent of training needs.

Preferred mode of training program: Most of the respondents (60%) preferred residential or in-person training or skill development programs rather than in online or virtual mode (15%). Whereas 19% of them preferred to attend the programs requiring practical exposure & skill enhancement to be residential and in-person and the rest to be in virtual mode.

Preferred duration of training program: A significant portion of the SMS (45%) preferred a training program lasting 5-7 days, while 26% favored a shorter duration of 3 days. Additionally, 16% expressed a preference for a two-week program, and only 13% indicated interest in attending a 10-day training and skill development session. The greater preference for short term programs among the SMS might be resulting from their difficulties and work pressure that limits them to be away from their KVK for longer duration at a stretch. It is advisable to formulate short capsule /modular programs of 3-5 days duration at a time in line with their nature of work. This is in line with the findings of Bhat *et al*. (2024) which reported that 35% of SMS preferred training programs of one week duration in Haryana.

Preferred fee structure: Majority of the respondents (88%) were willing to pay Rs.2500/- for attending online training program, whereas nearly half (48%) of the respondents were ready to pay Rs.5000 or more for attending a one-week training program in residential or hybrid mode (Fig. 8).

Conclusion

Subject Matter Specialists are the crusaders who reach out the farmers scattered around the rural areas with new, useful and practical information. The fact that the well-trained and competent SMS only could bring changes in the mindset of farmers cannot be denied. This is an attempt to provide an indication to the administrators and program planners about the factors that influence the training needs of the Subject Matter Specialist of KVKs which will be useful in prioritizing the training areas in which trainings are to be provided. Important training areas, mode, duration and fee preferred by KVK-SMS underlined in the study could be considered while planning a training program for the SMS. The significant difference in the preference of training areas by the SMS of the two states stresses the importance of conducting location specific training need assessments. As time and technology advance, usage of social media platforms for extending the services to the farmers will be a promising course of action to be adopted by the extension personnel. This study also calls out for the collaboration of ICAR Fisheries Research Institutes and College of Fisheries with KVKs in terms of knowledge sharing and development of sound technical materials which will act as a key for pulsating extension system.

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