Natural Resources for Human Health
eISSN: 2583-1194

Original Research

Received 12 April 2026
Revised 18 May 2026
Accepted 25 June 2026

Natural Resources for Human Health 2026, Vol. 6 (3s): 402–409

KEYWORDS:
fisheries extension; training needs assessment; Training Need Quotient; capacity building; Fishery Demonstrators; human capital

Training Needs Assessment and Capacity Building of Fishery Extension Personnel in India: Socio-Economic Correlates and Predictors of Felt Training Need

Sabia[1*], Dr. Rama Kant[2]

[1] PhD Scholar, Department of Zoology, Maharishi University of Information Technology, Lucknow, Uttar Pradesh, India
[2] Professor, Department of Zoology, Maharishi University of Information Technology, Lucknow, Uttar Pradesh, India
ahadjnb@gmail.com [1] Ramakant@muit.in [2]
*Corresponding author- ahadjnb@gmail.com

ABSTRACT: Effective delivery of fisheries extension services depends critically on the technical competence of front-line workers, yet systematic, evidence-based assessment of their felt training needs remains scarce in the Indian fisheries-extension literature. This study assessed the training needs of 180 baseline Fishery Demonstrators (F.Ds) engaged in government, non-governmental and progressive-farmer-linked extension delivery, across eleven technical subject areas spanning culture, breeding, feeding, water and soil quality, disease management, capture fisheries, resource management, fish seed, marketing, extension methodology and official work. A structured interview schedule captured socio-personal characteristics and felt training need (most needed / needed / least needed) for each of 41 specific items, from which a Training Need Quotient (TNQ) and mean need-score were computed per item and subject area. Water and soil quality (TNQ = 80.84%) and disease management (TNQ = 79.72%) emerged as the highest-priority subject areas, while capture-fisheries techniques (TNQ = 62.78%) ranked lowest. Correlation analysis showed that service experience was significantly and negatively associated with TNQ of culture ($r = -0.452$, $P < 0.01$) and breeding aspects ($r = -0.279$ to -0.452, $P < 0.05$), while the number of in-service training programmes already undergone was positively associated with TNQ of water-and-soil-quality, marketing and fish-seed aspects. Regression analysis confirmed that service experience and number of prior in-service trainings were the most consistent predictors of felt training need across subject areas, together explaining 13-26% of the variance in different models. The large majority of respondents (83.3%) were satisfied with their present position, yet only 27% were satisfied with their present salary, and the largest respondent shares favoured two-week duration (31.7%), an equal 50:50 theory-practical balance (48.3%), and training delivered outside the home state (top-ranked location). These findings provide an empirical basis for designing need-based, competency-linked capacity-building curricula for fisheries extension personnel in India.

1. INTRODUCTION

Fisheries extension occupies a pivotal position in translating research and policy outcomes into farm-level adoption, particularly in a sector where technology, disease profiles, and market conditions evolve rapidly. India's fisheries sector, contributing substantially to national GDP, export earnings and rural livelihoods, has expanded extension infrastructure through Fisheries Development Officers, Fishery Demonstrators, Matsya Seva Kendras and allied institutional mechanisms; nonetheless,

persistent gaps in the technical competence, field orientation and continuing professional development of front-line extension personnel remain a recognized constraint on the effectiveness of these delivery systems.

Training needs assessment (TNA) is the foundational step in designing effective capacity-building interventions, since a training programme built without reference to the felt needs of the target functionaries risks poor uptake, weak transfer of learning to the field, and inefficient use of scarce training resources. Within the broader agricultural-extension literature, TNA studies employing structured need-quotient scoring have been widely used to prioritize subject areas for Krishi Vigyan Kendra (KVK) and departmental training curricula, and comparable approaches have more recently been extended to inland and marine fisheries extension functionaries and to fish-farmer beneficiary groups.

Despite this growing body of work, empirical TNA studies specifically targeting baseline-level Fishery Demonstrators — the cadre most directly and continuously in contact with fish farmers at the village level — remain limited, and still fewer studies have examined how socio-personal characteristics of these functionaries (age, length of service, prior training exposure, income, distance from headquarters) shape their pattern of felt training need. Understanding these correlates is important because a one-size-fits-all training calendar is unlikely to be equally relevant across functionaries who differ substantially in tenure, prior exposure and field context.

The present study was therefore designed to (i) assess the training needs of baseline Fishery Demonstrators across eleven technical and administrative subject areas using a validated Training Need Quotient framework, (ii) identify the socio-personal and service-related correlates of felt training need, and (iii) examine respondents' preferences regarding training duration, timing, location and theory-practical balance, so as to inform the design of a more responsive, need-based capacity-building programme for fisheries extension personnel.

2. MATERIALS AND METHODS

The overall methodological sequence, from respondent selection through statistical analysis, is summarized in Figure 1.

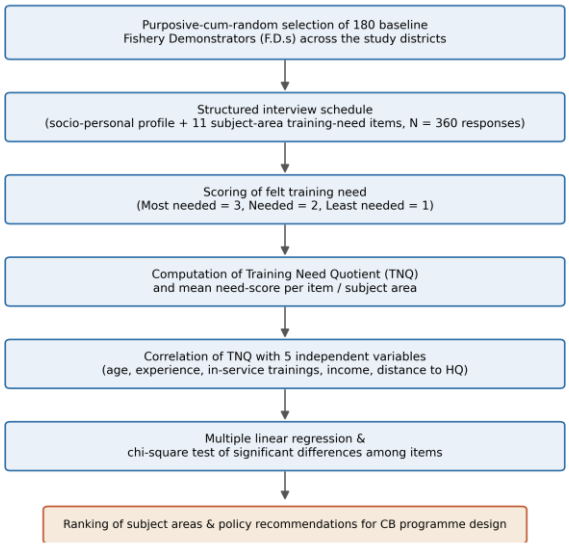

Figure 1: Schematic workflow of respondent selection, data collection, Training Need Quotient (TNQ) computation and statistical analysis.

2.1 Sampling and respondents

The study was conducted among 180 baseline extension functionaries, designated Fishery Demonstrators (F.Ds), drawn from government fisheries departments, non-governmental organizations active in the fisheries sector, and progressive fish-farmer cadres serving in an extension-facilitation capacity. Respondents were selected using a purposive-cum-random sampling procedure to ensure representation across service length, rural/urban posting and administrative distance from district headquarters.

2.2 Interview schedule and subject-area coverage

Data were collected using a pre-tested structured interview schedule comprising two parts. Part I recorded socio-personal and service-related characteristics: age, length of service, rural/urban background, number of in-service training programmes previously undergone, total monthly family income, distance between place of posting and district headquarters, and type of residential accommodation. Part II elicited felt training need across eleven technical and administrative subject areas — culture, breeding, feeding, water and soil quality, disease management, capture, resource management, fish seed, marketing, extension methodology and official work — comprising 41 specific items in total, each scored on a three-point felt-need scale (Most needed, Needed, Least needed) yielding 360 total item-responses across the sample.

2.3 Training Need Quotient (TNQ) and mean need-score

For each item, a Training Need Quotient was computed as TNQ (%) = $[(3\times n_1 + 2\times n_2 + 1\times n_3) / (3\times N)] \times 100$, where n_1, n_2 and n_3 are the number of respondents indicating the item as most needed, needed and least needed respectively, and N is the total number of respondents. Item-level TNQ values were averaged to obtain subject-area TNQ and subject areas were ranked accordingly. An analogous mean need-score (range 1-3) was computed per item and subject area.

2.4 Preference ranking

Respondent preferences regarding the season, duration, location and theory-practical ratio of training programmes were elicited through direct and rank-order questions; rank-order responses were converted to weighted scores (rank value × frequency) and summed across preference positions to derive an overall preference ranking for each option.

2.5 Relational and predictive analysis

Pearson correlation coefficients were computed between subject-area TNQ and five independent variables (age, service experience, number of in-service trainings undergone, total monthly family income, and distance to district headquarters). Multiple linear regression was subsequently used to identify the relative contribution of each independent variable to variance in subject-area TNQ, and chi-square tests were used to assess whether felt-need distribution differed significantly among items within each subject area.

3. RESULTS

3.1 Socio-personal profile of respondents

The majority of respondents (53%) fell in the 41-49-year middle-age category, with a mean age of 48 ± 6.47 years (Figure 2a). Service experience ranged from 2 to 37 years, with 63% of respondents having served 21 years or more (mean 22 ± 6.79 years). Eighty-eight per cent of respondents came from a rural background (Figure 2b). Forty-four per cent had undergone only one in-service training programme and 39% had received none at all, indicating limited continuing-education exposure across the cadre. Mean monthly family income was Rs. 17,472 ± 4,443.62, and 82% of respondents were posted within 50 km of their district headquarters. Fifty-nine per cent lived in rented accommodation. Job satisfaction was notably higher than salary satisfaction: 83.3% of respondents reported satisfaction with their present position, but only 27% were satisfied with their present salary (Figure 2c), pointing to a potential retention and morale concern despite generally positive engagement with the extension role itself.

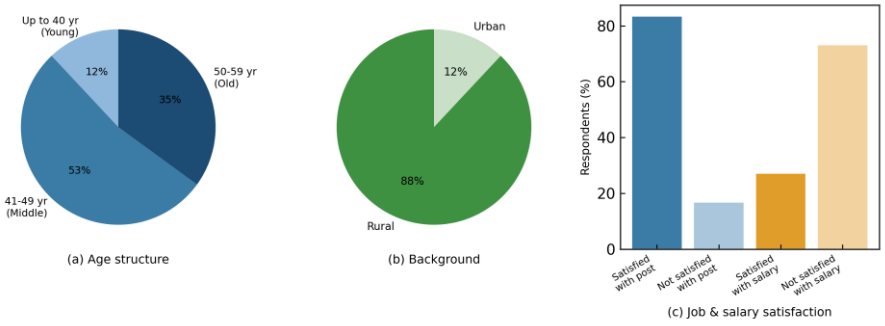

Figure 2: Socio-personal profile of respondents: (a) age structure, (b) rural/urban background, (c) job and salary satisfaction.

3.2 Training need by subject area

Average subject-area TNQ ranged from 62.78% (capture aspect) to 80.84% (water and soil quality aspect) (Table 1, Figure 3). In descending order of priority, the eleven subject areas ranked: water and soil quality (80.84%) > disease (79.72%) > fish seed (78.52%) > breeding (76.67%) > feeding (72.59%) > resource management (72.36%) > culture (70.32%) > marketing (69.63%) > official work (68.75%) > extension methodology (63.67%) > capture (62.78%). Chi-square tests confirmed statistically significant differences in felt need among items within most subject areas ($P < 0.01$), with the exception of the two items comprising the water-and-soil-quality aspect, which did not differ significantly from one another — both being rated consistently high. Within the water-and-soil-quality aspect, the specific item 'use of computerized and digital advances in soil and water testing kits and their operation' was rated most needed by 53.3% of respondents, reflecting a clear demand for technology-linked skill upgrading.

Table 1: Average Training Need Quotient (TNQ), mean need-score and rank of eleven subject areas (N = 180; 360 item-responses).

Subject area	Average TNQ (%)	Mean score	Rank
Water and soil quality	80.84	2.43	1
Disease	79.72	2.39	2
Fish seed	78.52	2.35	3
Breeding	76.67	2.30	4
Feeding	72.59	2.18	5
Resource management	72.36	2.17	6
Culture	70.32	2.11	7
Marketing	69.63	2.09	8
Official work	68.75	2.07	9
Extension	63.67	2.21	10
Capture	62.78	1.88	11

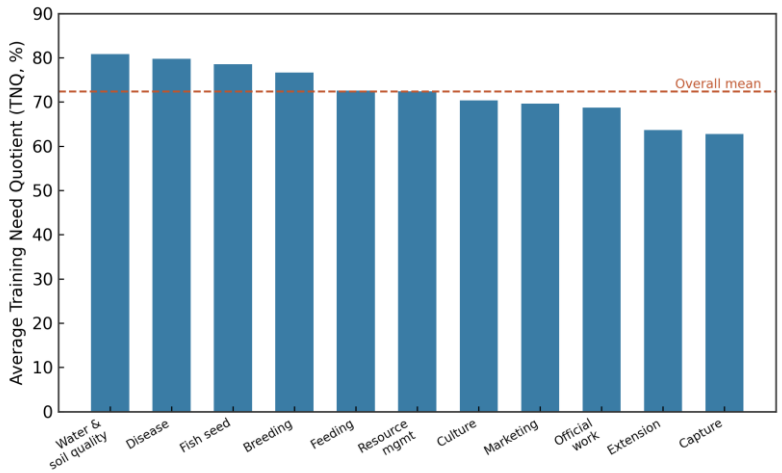

Figure 3: Ranking of subject areas by average Training Need Quotient (TNQ), with overall mean reference line.

3.3 Correlates of felt training need

Correlation analysis (Table 2, Figure 4) revealed that service experience was significantly and negatively correlated with TNQ of the culture aspect ($r = -0.452$, $P < 0.01$) and the breeding aspect ($r = -0.30$, $P < 0.05$), indicating that more experienced functionaries reported comparatively lower felt need in these foundational technical areas. Age showed a similar but generally weaker negative association across subject areas. The number of in-service training programmes already undergone was positively correlated with TNQ of the water-and-soil-quality ($r = 0.255$, $P < 0.05$) and marketing ($r = 0.285$, $P < 0.05$) aspects — a pattern suggesting that exposure to earlier training may itself have sharpened awareness of the extent of remaining skill gaps in these technically evolving areas, sometimes described as a 'training begets need-awareness' effect. Total monthly family income was significantly negatively correlated with TNQ of the resource-management aspect ($r = -0.240$, $P < 0.05$), while distance to district headquarters showed significant positive correlation with TNQ of the disease and fish-seed aspects ($P < 0.05$), consistent with more remotely posted functionaries reporting greater unmet need in these service-delivery-dependent areas.

Table 2: Correlation (r) of subject-area TNQ with independent variables. *P<0.05, **P<0.01, NS = not significant.

Subject area	Age	Service experience	In-service trainings	Family income	Distance to HQ
Culture	-0.320*	-0.452**	0.036 NS	-0.277*	0.245 NS
Breeding	-0.230 NS	-0.300*	0.070 NS	-0.050 NS	0.310*
Feeding	-0.229 NS	-0.279*	0.150 NS	-0.120 NS	0.180 NS
Water & soil quality	-0.070 NS	-0.101 NS	0.255*	0.014 NS	0.110 NS
Disease	-0.060 NS	-0.040 NS	0.120 NS	-0.030 NS	0.267*
Capture	-0.002 NS	-0.072 NS	0.076 NS	-0.126 NS	-0.068 NS
Resource management	-0.090 NS	-0.110 NS	0.080 NS	-0.240*	-0.060 NS
Fish seed	-0.047 NS	-0.091 NS	0.086 NS	-0.049 NS	0.267*
Marketing	-0.042 NS	-0.100 NS	0.285*	0.055 NS	0.194 NS
Official work	-0.065 NS	-0.037 NS	0.127 NS	-0.220 NS	0.194 NS

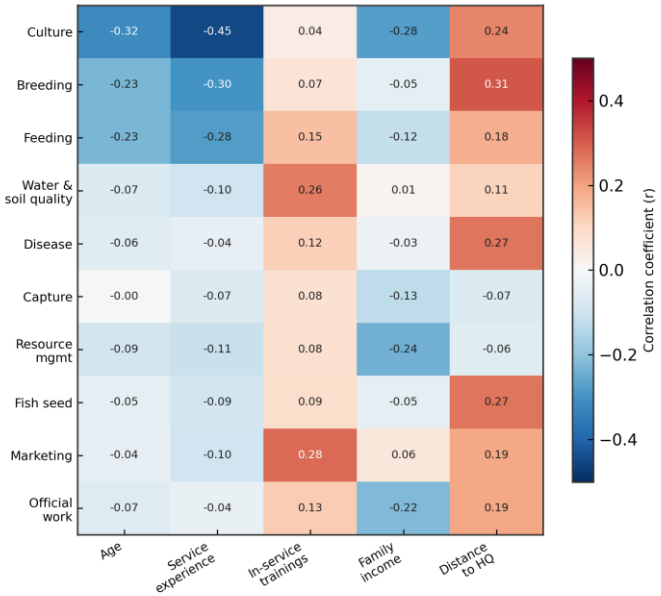

Figure 4: Heat-map of correlation coefficients between subject-area TNQ and socio-personal / service-related independent variables.

3.4 Predictors from regression analysis

Multiple regression models explained between 1.3% and 25.9% of variance in subject-area TNQ depending on the technical domain (Table 3). Service experience was the most consistent significant predictor, contributing most strongly to variance in TNQ of the culture aspect ($t = 2.631$, $P < 0.05$; $R^2 = 0.259$), while the number of in-service trainings undergone was the strongest predictor for the water-and-soil-quality aspect ($t = 2.044$, $P < 0.05$, though overall model R^2 was low at 0.013), and distance to headquarters was the strongest predictor for the breeding aspect ($t = 2.854$, $P < 0.01$). These results indicate that no single independent variable dominates across all technical domains, reinforcing the case for a differentiated, subject-area-specific approach to training-needs prioritization rather than a uniform capacity-building calendar.

Table 3: Summary of multiple-regression predictors of subject-area TNQ (selected subject areas). *P<0.05, **P<0.01.

Subject area	Most significant predictor	t-value	R^2 (%)
Culture	Service experience	2.631*	25.9
Breeding	Distance to HQ	2.854**	23.6
Feeding	-- (all NS)	--	13.3
Water and soil quality	In-service trainings	2.044*	1.3

Table 4: Respondent preferences for training delivery format.

Preference dimension	Top-ranked option	Weighted score / %
Season	Oct-Nov-Dec-Jan-Feb-Mar / Sept (tied)	498
Duration	Two weeks	31.7%
Location	Outside the state	591
Theory:Practical ratio	50:50	48.3%
Job satisfaction	Satisfied with present post	83.3%
Salary satisfaction	Not satisfied with present salary	73.0%

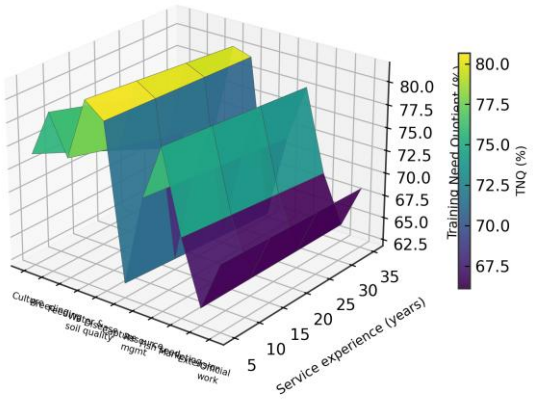

Figure 5: Illustrative response surface of Training Need Quotient across subject areas and service-experience band, derived from the reported experience-TNQ correlations (schematic visualization, not a direct data plot).

3.5 Preferences for training delivery

October-November-December-January-February-March collectively ranked as the most preferred training window (weighted score 498, tied rank 1 with September at 498), consistent with the post-monsoon lull in field fishing and farming activity. Two-week training duration was preferred by the largest share of respondents (31.7%), followed by four-week (25.0%) and more-than-four-week (16.7%) options; only 1.7% preferred courses shorter than one week. Training conducted outside the home state was the most preferred location (weighted score 591), ahead of College of Fisheries (564), Directorate office (324) and District headquarters (321), suggesting a strong preference for exposure-oriented training away from the routine work environment. Nearly half of respondents (48.3%) favoured an equal 50:50 theory-practical balance, while 28.3% preferred a practical-weighted 25:75 ratio, together indicating a clear demand for field-oriented, hands-on training content over classroom-dominated instruction.

4. DISCUSSION

The finding that water-and-soil-quality management and disease diagnosis rank as the two highest-priority subject areas is consistent with the broader shift in Indian aquaculture toward intensification, in which farmers increasingly depend on extension functionaries for guidance on pond-water parameters, biosecurity and disease outbreaks that were less consequential under traditional extensive culture. This mirrors observations from training-needs studies of fish farmers and extension trainees in other Indian states, where technology-linked and health-management competencies consistently rank above traditional culture-practice knowledge.

The negative correlation between service experience and felt need in culture and breeding aspects is intuitive — functionaries with longer tenure have had more field exposure and informal on-the-job learning in these foundational areas — but the persistence of high need scores for water-and-soil-quality and disease management even among senior functionaries suggests that these domains are evolving faster than informal on-the-job learning can compensate for, reinforcing the case for periodic refresher training regardless of seniority. The positive association between prior training exposure and felt need in technologically dynamic areas such as digital water-testing tools and marketing is consistent with an awareness-raising effect of training documented in other capacity-building evaluations, where initial exposure to a domain increases functionaries' ability to recognize the extent of their remaining knowledge gaps rather than fully closing them.

The pronounced preference for two-week, field-oriented, extra-state training aligns with findings from skill-development impact assessments in the inland fisheries sector, which have recommended more practical, field-exposure-based training cycles, systematic training-need analysis, and structured post-training follow-up as means of improving the transfer of learning to job performance. The gap between high job satisfaction (83.3%) and low salary satisfaction (27%) observed here echoes similar findings among fisheries and agricultural extension cadres elsewhere in India, and — while outside the direct scope of a training-needs assessment — signals a parallel human-resource concern that capacity-building investments alone will not resolve.

The subject-area-specific pattern of predictors emerging from the regression analysis, in which no single socio-personal variable explains felt need consistently across domains, argues against a uniform, seniority- or tenure-based allocation of training slots. Instead, training-needs data of the kind generated here should feed into a differentiated curriculum design process in which subject-area content is matched to functionary sub-groups defined jointly by experience, prior exposure and posting location.

5. CONCLUSION

This study provides a systematic, quantified assessment of the training needs of baseline fisheries extension functionaries in India, showing that water-and-soil-quality management and disease diagnosis are the highest-priority capacity-building domains, that service experience and prior training exposure are the most consistent — though domain-specific — predictors of felt need, and that functionaries strongly prefer short-duration, field-oriented, extra-state training delivered in a balanced theory-practical format. These findings offer extension-planning agencies an empirical basis for designing differentiated, need-responsive capacity-building curricula rather than uniform training calendars, and highlight water-quality and health-management competencies as priority investment areas for strengthening fisheries extension delivery.

REFERENCES

[1] Abhay, K., Singh, A.K., Ujjwal, K., Singh, K.M., Singh, R.K.P. and Bharati, R.C. (2018). Training needs assessment of farmers of Bihar: A zone-wise analysis. Journal of AgriSearch, 5(2): 89-95.

[2] Barbazette, J. (2006). Training Needs Assessment: Methods, Tools, and Techniques. Pfeiffer, San Francisco.

[3] Chandawat, M.S., Bhimawat, B.S. and Jaitwant, G.S. (2004). Farmers' opinion about KVK trainings. Indian Research Journal of Extension Education, 4(1&2): 97-100.

[4] Devaraj, M., Sathiadhas, R. and Reghu, R. (1998). Techno-economic assessment of marine fish production and terminal market distribution in India. Fishery Technology, 35(1): 1-10.

[5] Kanaga, S. and Sivasankar, P. (2015). A study on the constraints faced by fishermen in marine fisheries at Therespuram. Journal of Extension Education, 27(2): 5451-5456.

[6] Lahiri, B., Kurmi, R.K., Singh, S.K., Ghosh, A., Pal, P., Pavan Kumar, S.T., Nirmalkar, C. and Debnath, A. (2024). Crew position-based assessment of fishermen's knowledge needs in coastal districts of Tamil Nadu. Indian Journal of Extension Education, 60(4): 45-52.

[7] Mohanty, B.P., Som, S. and Mahanty, A. (2018). Food and nutritional security: Solutions from the blues. Agriculture World, 4(10): 76-83.

[8] Nain, M.S. and Kumar, A. (2001). Perception based assessment of training of trainers on ornamental fisheries. Indian Journal of Extension Education, 55(4): 49-55.

[9] Pal, P.K., Bhutia, P.B., Das, L., Lepcha, N. and Nain, M.S. (2017). Livelihood diversity in family farming in selected hill areas of West Bengal, India. Journal of Community Mobilization and Sustainable Development, 12(2): 172-178.

[10] Panikkar, K.K.P. and Alagaraja, K. (1981). Scope and research needs in fisheries socio-economics in India. Marine Fisheries Information Service, 32: 1-8.

[11] Panikkar, K.K.P. and Srinath, K. (1991). Impact of mechanized boats on the economic status of traditional fishermen in Calicut region of Kerala. Marine Fisheries Information Service, 108: 1-6.

[12] Sajeev, M. and Singha, A. (2010). Capacity building through KVKs: Training needs analysis of farmers of Arunachal Pradesh. Indian Research Journal of Extension Education, 10(1): 83-90.

[13] Sajeev, M., Singha, A. and Venkatasubramanian, V. (2012). Training needs of farmers and rural youth: An analysis of Manipur state. Indian Journal of Agricultural Sciences, 3(2): 103-112.

[14] Sathiadhas, R. and Panikkar, K.K.P. (1988). Socio-economic status of small-scale fisherfolk of India's east coast. Marine Fisheries Information Service, 84: 1-9.

[15] Senthilathiban, B., Kumaran, M. and Balasubramanian, T.S. (1989). Cost of production and net income of fishing households in selected fishing villages of Thoothukudi district. Fishery Technology, 26(2): 118-123.

[16] Sheela Immanuel (1997). Problems faced by fisherwomen in seaweed collection in Ramanathapuram district of Tamil Nadu. Fishery Technology, 34(2): 145-149.

[17] Singh, S.K., Sharma, K.D. and Sinha, M.M. (1995). Social status and socio-economic problems of fishermen living along the Ganga and the Yamuna at Allahabad. Journal of the Inland Fisheries Society of India, 27(1): 45-52.

[18] Mondal, A.H., Dana, S.S., Sarkar, M.R., Karjee, R. and Rej, N. (2025). Training needs of member fish farmers of FFPOs in Purba Medinipur district of West Bengal. Indian Journal of Extension Education, 61(2): 41-47.

[19] Somasundaram, S. and Kanagasabapathi, K. (2018). Assessing trainees' experience from skill development programmes on inland fisheries management and its impact on human capital. Journal of the Inland Fisheries Society of India, 50(1): 55-63.

[20] Reinhold, S., Gegenfurtner, A. and Lewalter, D. (2018). Social support and motivation to transfer as predictors of training transfer. Human Resource Development Quarterly, 29(2): 175-197.