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Assessment of information seeking behaviour and constraints in obtaining information of public and private aquaculture extension personnel

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ABSTRACT

The study assessed the information sources, information seeking behaviour and constraints in obtaining information of public and private aquaculture extension personnel in Andhra Pradesh and Tamil Nadu states of India. A structured and pre-tested interview schedule was used for data collection from a total of 120 extension personnel comprising 60 each in public and private sectors in the study area. Results showed that staff training institutions of their department were the major information source for majority of the public extension personnel (85.00%) whereas fellow technicians (83.33%) and the research wing of their company (80.00%) were the primary information sources. Furthermore age, higher education, vast experience and more participation in training programmes were the major factors influencing the information-seeking behaviour of the extension personnel. The results also revealed that major constraint in information-seeking behaviour of public and private extension personnel was lack of time to seek information from various resources.

Keywords: Aquaculture; extension; information; constraints

INTRODUCTION

Globally countries have reaffirmed the essential role that farm extension services can play in agrarian development (Birner et al 2006, Anderson 2007) and this renewed interest in farm extension is linked to the rediscovery of the role that farm sector needs to play in reducing persistent rural poverty (Anon 2007). Effective extension service is the source of aquaculture information and technologies to farmers as well as feedback to researchers and policymakers about the aqua farmers' problems, needs and concerns. Generally extension aims to provide up to date and reliable information about the farming to those who need it in a way that is understandable as well as useful to them (Jacobsen 1987).

Aquaculture extension system has played an important role in helping aquaculture farmers to overcome production related problems by transferring the relevant technology to them. Fisheries and aquaculture in India being the state subject, the maritime states have the major responsibility in providing this key support. Aquaculture extension personnel are the key facilitators of the farming community to access quality farm inputs, farm machinery, technical counselling, institutional credit, better price and mobilise them for a collective compliance of farm practices to achieve sustainability.

In today's world information is indeed a unique prerequisite for making wise decisions. Hence the extension personnel are expected to be the rigorous information seekers to keep themselves updated in every aspect of on-farm and off-farm aspects (Wilson 2000, Meho and Haas 2001). The knowledge level of extension personnel on the subject matter is recognized as an important element and seen as a critical factor in determining the effectiveness of extension service (Buford et al 1995, Chizari et al 1998). The extension personnel need to be technically equipped with all the latest developments on the farm technologies for which

access to information and improved communication is a crucial requirement. Hence the present study was undertaken to explore the information seeking behaviour of the extension personnel with the objectives to identify the information seeking behavior of public and private aquaculture extension personnel, understand the influence of socio-personal attributes on their information seeking behaviour and identify their constraints in obtaining information and performing extension work.

METHODOLOGY

The study was conducted in two southern coastal states of India viz Andhra Pradesh and Tamil Nadu selected purposively as Andhra Pradesh is the leading state in coastal aquaculture development with a contribution of more than 50 per cent of the country's area and nearly half of the farmed shrimp production whereas Tamil Nadu ranks first in terms of productivity of shrimp production in the country. Three districts each from the identified states were selected viz Nellore, Prakasam and Guntur from Andhra Pradesh and Cuddalore, Nagapattinam and Thanjavur from Tamil Nadu.

Respondents' sample size and sampling procedure

Extension personnel belonging to government funded extension agencies (public extension) and private input company technicians and independent aqua consultants (private extension) were selected as the respondents for the present study. For public extension, personnel belonging to government funded extension agencies viz 10 officials of State Department of Fisheries (DoF), the Marine Products Export Development Authority (MPEDA) and National Centre for Sustainable Aquaculture (NaCSA) from each district of both the states who were dealing with transfer of technology were randomly selected to constitute a total sample size of 60. Similarly for private extension, 10 marketing personnel of farm input companies and private aqua consultants from each district of both the states who were providing extension services to the aqua farmers in the respective regions were randomly selected to constitute the total sample size of 60.

A structured and pre-tested interview schedule was used for data collection. Personal attributes viz age, education, aquaculture experience, trainings undergone, place of residence and work, aptitude to collaborative work and extension methodology employed were studied.

An ex post-facto research design was employed to study the information seeking behaviour of aquaculture extension personnel. The information seeking behavior in the present study was operationalised as the extent to which an individual approached different kinds of sources, the frequency of seeking the information from the source, sharing and confirmation of the received information. This was measured on three groups of information sources viz institutional sources, mass media sources and private extension sources. A summated scoring procedure was developed to study the information seeking behavior of the respondents that constituted information source (1 score for each information source used), frequency of use (frequent- 2, occasional- 1 and never- 0) and level of satisfaction (satisfied- 1 and not satisfied- 0). The scores on the parameters were added to arrive the information seeking behaviour of the respondents. Data collected were analyzed using the statistical package for the social sciences (SPSS). Appropriate statistical procedures for description (frequencies, percentages, means and standard deviations) were used.

RESULTS and DISCUSSION

Socio-personal attributes of extension personnel

The pooled results of socio-personal attributes of the extension personnel (Table 1) reveal that the young, middle and old age group respondents of public extension service were distributed more or less equally in number. Although the respondents in young age group (38.33%) were highest, the number of respondents in middle (26.67%) and old (35.00%) age groups were also substantial. In case of private extension personnel the respondents were in young and middle age groups only. About two-third of the respondents (63.33%) were young while about one-third of them (36.67%) were in middle age group. Private extension personnel working in input companies and private consultancy belonged to young and middle age groups. Since aqua farms were located in remote locations the private extension personnel working in input companies had to travel extensively for the extension services. Hence the private input companies were in favour of recruiting the young age group fisheries graduates for extension services.

Table 1. Socio-personal attributes of the extension personnel

Category	Public extension personnel (n= 60)		Private extension personnel (n= 60)	
	Number	%	Number	%
Age (years)				
Young (up to 34)	23	38.33	38	63.33
Middle (35-44)	16	26.67	22	36.67
Old (45 and above)	21	35.00	0	0.00
Educational status				
Degree or diploma	19	31.67	17	28.33
BSc +/ BFSc	4	6.67	2	3.33
MSc	11	18.33	33	55.00
MSc +/ MFSc	24	40.00	8	13.33
Above MFSc	2	3.33	0	0.00
Experience (years)				
Up to 5	26	43.33	26	43.33
5-10	11	18.33	20	33.33
>10	23	38.33	14	23.33
Number of trainings undergone				
Nil	4	6.67	12	20.00
Up to 2	38	63.33	43	71.67
>2	18	30.00	5	8.33
Place of residence and work				
Residing in same place of work	53	88.33	53	88.33
Residing in different place of work	7	11.67	7	11.67
Aptitude to collaborative work				
Willing to do collaborative work	55	91.67	52	86.67
Not willing to do collaborative work	5	8.33	8	13.33
Extension methodology employed*				
On campus trainings	22	36.67	0	0.00
Off campus trainings	0	00.00	8	13.33
Method/result demonstrations	5	8.33	26	43.33
Workshops/seminars	5	8.33	0	0.00
Farmers' meets	30	50.00	29	48.33
Farm visits	35	58.33	60	100.00
Programmes through mass media (print, radio, TV)	11	18.33	0	0.00
Exhibitions	10	16.67	4	6.67

*Multiple responses

Majority of the respondents in public extension service (40.00%) possessed postgraduate degree in fisheries science or marine biology or zoology with aquaculture subjects. About one-third of the respondents were graduates or diploma holders in biology/zoology subjects. In the case of private extension personnel, more than half of the respondents were (55.00%) postgraduates in marine biology or coastal aquaculture followed by degree or diploma in biological science (28.33%). Graduates in fisheries science or general science with further higher qualification were found to be 13.33 per cent. The findings showed that graduates from the fisheries research and academic background were recruited as extension personnel in both public and private extension sectors. Similar finding ie high formal education of extension personnel has been reported by Idiake-Ochei et al (2016).

The results revealed that both in public and private extension services nearly half of the respondents (43.33%) had an experience of up to 5

years. More than one-third of the respondents (38.33%) of public extension service had put in more than 10 year of service and 18.33 per cent had 5-10 years of experience. In case of private extension personnel one-third of the respondents (33.33%) were reported to have put in service of between 5-10 years while about one-fourth of the respondents (23.33%) had more than 10 years of experience. Although over one-third of the respondents in public extension service had more than 10 years of experience majority of them had less than three years of continued field experience in coastal aquaculture and were more engaged in administrative and welfare activities. The findings of the present study are similar to the observations made by Kumaran et al (2007).

The results also revealed that majority of the respondents in both the public (63.33%) and private (71.67%) extension services had undergone up to two training programmes related to shrimp farming. Most of the respondents in both the services reported that they had undergone induction training at the time of entry into service. Majority in public and private extension services had undergone trainings on shrimp farming and related fields.

Majority of the respondents (88.33%) in both the services resided at their places of work. About 12 per cent each of the public and private extension personnel commuted from places of stay. This reveals that the majority of the extension personnel resided at their places of work so that they could dedicate most of their time on extension services.

It was observed that majority of the respondents in both public (91.67%) and private (86.67%) extension services were in favour of working in collaboration with other developmental departments or private organizations for sustainable development of coastal aquaculture in the region.

In response to extension methodology employed 36.67 per cent of public extension personnel reported that they had conducted off-campus trainings on shrimp farming practices for aqua farmers. Half of the respondents (50%) reported that they had organised farmers' meets in farmers' villages to create awareness on the best management practices (BMPs) of shrimp farming. Farm visit to individual shrimp farm for providing technical guidance was reported by 58.33 per cent respondents and 8.33 per cent respondents reported that they had conducted method/result demonstrations in farmers' ponds on shrimp farming practices. Apart from this 18.33 and 16.67 per cent respondents respectively reported that mass media (radio and television) and exhibitions were employed as extension methods. The private extension personnel (100%) had adopted farm visits to each of their client shrimp farms once a week for a direct personal contact and provided technical guidance on BMPs. Pamphlets and printed material in local language was used as extension material during the farm visits. The farmers were given personal mobile phone numbers so that they could contact the extension personnel as and when required. Farmers' meets, up to three meetings per culture were the next preferred extension methodology as reported by about half of the respondents (48.33%) and 43.33 per cent respondents reported that minimum one demonstration per culture was conducted by them in farmers' ponds on important aspects like disease prevention and management, water quality management, feed management etc. Field trainings (13.33%) and exhibitions (6.67%) were the other methods used by the respondents to influence the farmers to adopt their advice. Farm publications, specimens, mass media etc were used extensively during these events.

All these programmes were followed up during their regular farm visits. The findings have shown that private extension personnel had better contacts with the aqua farmers in providing the extension services. Public extension personnel could not dedicate their full time to extension service due to their more involvement in administrative and welfare activities.

Information seeking behaviour of extension personnel

Public extension personnel: The results of information seeking, checking and sharing behaviour of public extension personnel (Table 2, Fig 1) revealed that the staff training institutions (85.00%) of their respective departments were their major information source. The staff training institutions offered induction and in-service trainings to their field personnel. It was expressed that the opportunity for trainings was given once in few years and the content of the trainings was also mostly of routine nature. About two-third of the respondents expressed that MPEDA (63.33%) and printed publications like technical manuals, bulletins, extension literature and reports on fishery research and development institutions were the other important information sources.

Table 2. Information source, checking and sharing behavior of public extension personnel (n= 60)

Information source	Response (%)*	Information received	Extension approach	Frequency	Triangulation
Coastal Aquaculture Authority	23.33	Regulations and guidelines	Group contact	Occasional	Fellow extension officers
Research institutes	30.00	Farming practices	Group contact	Occasional	Fellow extension officers
Department of Fisheries	85.00	Regulations and guidelines	Group contact	Occasional	Fellow extension officers
MPEDA	63.33	Farming practices, guidelines and schemes	Group contact	Occasional	Fellow extension officers
Fisheries college	36.67	Farming practices	Group contact	Occasional	Fellow extension officers
Print media	63.33	Farming practices, guidelines and schemes	Mass contact	Often	Fellow extension officers
Online resources	36.67	Farming practices, guidelines and schemes	Mass contact	Often	Fellow extension officers
Fellow extension officers	56.67	Farming practices, regulations, guidelines and schemes	Individual contact	Often	Fellow extension officers

*Multiple responses

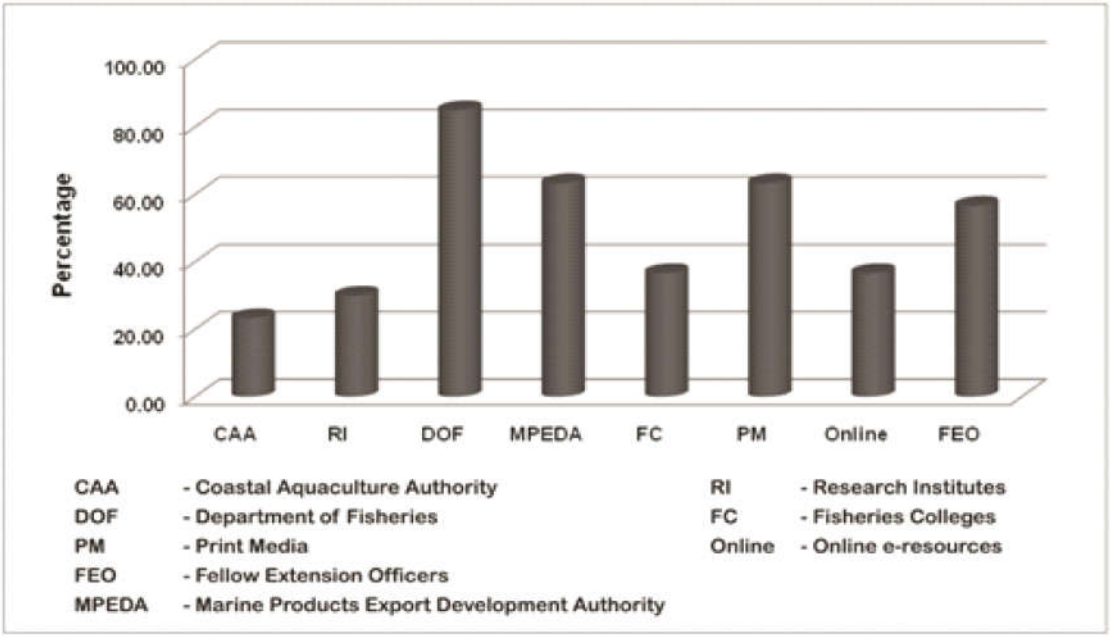

Fig 1. Information sources of public extension personnel (n= 60)

MPEDA being the promoter of aquaculture offered several subsidy-oriented schemes and the DoF was an official member in identifying beneficiaries in such committees. The extension officers on behalf of their superiors attended such meetings and interacted with MPEDA officials and exchanged field level information. Fishery research institutions published technical reports, posters, bulletins and manuals as part of their human resource development efforts and were supplied to the extension organizations for wider distribution to the end users. Information from fellow extension personnel (56.67%) was reported to be the next major information source. Personnel discussion with the fellow extension personnel provided them

information on the latest technological advancements. About one-third of the respondents reported that fisheries college (36.67%) and online resources (36.67%) were their important sources. This may be due to respondents' personal rapport and interaction with the institutions and awareness and interest in online resources. Research institutes of ICAR and Coastal Aquaculture Authority (CAA) were other information sources for 30.00 and 23.33 per cent of the respondents respectively. The frequency of consultation with these sources was at occasional intervals. Some respondents had attended trainings conducted by the research institutions and felt satisfied with the contents. CAA which issued

Table 3. Information seeking, checking and sharing behavior of private extension personnel (n= 60)

Information source	Response (%)*	Information received	Extension approach	Frequency	Triangulation
Coastal Aquaculture Authority	8.33	Regulations and guidelines	Group approach	Occasional	Fellow technicians and aqua farmers
Research institutes	18.33	Farming practices	Group contact	Occasional	Fellow technicians and aqua farmers
Department of Fisheries	6.67	Regulations and guidelines	Group contact	Occasional	Fellow technicians and aqua farmers
MPEDA	43.33	Farming practices, guidelines and schemes	Group contact	Occasional	Fellow technicians and aqua farmers
Fisheries college	8.33	Farming practices	Group contact	Occasional	Fellow technicians and aqua farmers
Print media	71.67	Farming practices, guidelines and schemes	Mass contact	Often	Fellow technicians and aqua farmers
Online resources	23.33	Farming practices, guidelines and schemes	Mass contact	Often	Fellow technicians and aqua farmers
Research wing with parent company	80.00	Farming practices	Group approach	Twice an year	Fellow technicians and aqua farmers
Fellow technicians	83.33	Farming practices, regulations, guidelines and schemes	Individual contact	Often	Fellow technicians and aqua farmers

*Multiple responses

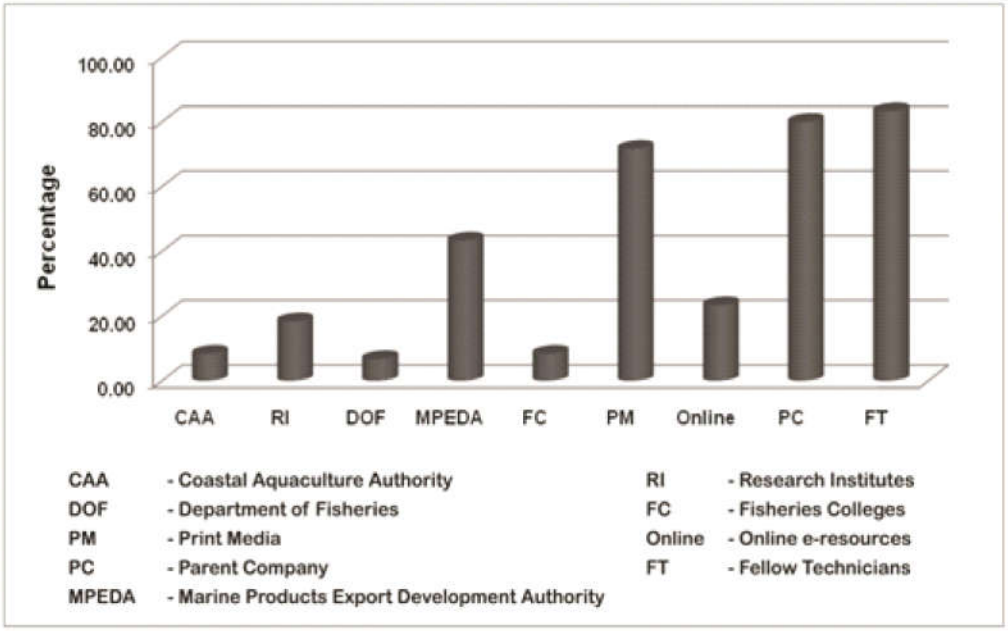

Fig 2. Information sources of private extension personnel (n= 60)

guidelines of aquaculture to regulate aquaculture growth through DoF was also an information source for them.

Private extension personnel

The results of information seeking, checking and sharing behaviour pertaining to private extension personnel (Table 3, Fig 2) revealed that fellow technicians of their company and experience sharing meetings, trainings and review meetings held with the research wing of the company were the primary information source for majority of the respondents (83.33 and 80.00% respectively). Personal discussions often held with fellow technicians and review meetings with the research wing of the company updated their subject matter information which was fully shared with other fellow technicians and shrimp farmers. Printed publications of the company like posters, manuals, guides, pamphlets etc were reported as the important information sources for majority of the respondents (71.67%).

In all 43.33 per cent of the respondents reported that MPEDA was their information source through the meetings it organized and its printed literature. MPEDA offered many subsidy-oriented schemes to the end users to promote aquaculture and moreover input producers had to approach it for availing license and approval for their inputs. Hence the respondents participated in the programmes organized by MPEDA and acquired pertinent information. Online e-resources were an important source of information for about one-fourth of the respondents (23.33%). They felt that online sources provided them findings of relevant research conducted world over to update their knowledge and such information was also shared with fellow technicians and aqua farmers. However the research institutions and fisheries colleges which were the main knowledge source were viewed as information source by 18.33 and 8.33 per cent of the respondents respectively who had personal association with them. CAA and the state DoF were the preferred information sources for 8.33 and 6.67 per cent of the respondents respectively and their main discussions were on guidelines and regulations for undertaking coastal aquaculture.

Influence of socio-personal attributes on information seeking behavior of extension personnel

A multiple regression analysis was carried out to assess the degree of influence of socio-personal attributes of the extension personnel on their information seeking behavior (Table 4). The analysis revealed that 47.80 per cent (R^2= 0.478) of variance in the information seeking behaviour of public extension personnel and 44.20 per cent (R^2= 0.442) of private extension personnel was together influenced by their socio-personal attributes. Among the socio-personal attributes of public extension personnel age and experience put in had a significant influence at 1 per cent level of significance. However for private extension personnel educational level and trainings undergone had a significant influence at 5 per cent level of significance. The findings revealed that age, higher education, vast experience and more participation in training programmes would facilitate the respondents in accessing the important information

Table 4. Influence of socio-personal attributes of extension personnel on their information seeking behaviour

Attribute	Public extension personnel (n= 60) (R^2= 0.478)		Private extension personnel (n= 60) (R^2= 0.442)	
	Regression coefficient (b)	SE	Regression coefficient (b)	SE
Age	0.373*	0.188	-0.03451	0.108
Education	0.559	0.767	1.514**	0.567
Experience	0.546*	0.228	0.01156	0.179
Training	-1.260	0.814	2.827**	1.149
Place of residence	-2.728	2.523	-1.442	1.779
Extension methodology	-0.407	0.254	0.371	0.487
Willingness for collaborative work	4.468	2.509	2.685	1.923

*Significant at 5% level of significance, **Significant at 1% level of significance

Table 5. Perceived constraints of extension personnel in obtaining information

Component	Public extension personnel (n= 60)*		Private extension personnel (n= 60)*	
	%	Rank	%	Rank
Extension personnel have little time to seek information	83.33	I	88.33	I
Extension personnel lack skills in translating scientific information into extension language	8.33	VIII	5.00	VIII
Training to raise extension personnel's knowledge and skills is infrequent	80.00	II	35.00	VII
Printed materials are not received regularly	36.67	VII	56.67	V
Research publications are not relevant to field problems	70.00	IV	85.00	III
Technology recommendations are difficult to derive from research publications	66.67	V	80.00	IV
Lack of access to on-line resources	58.33	VI	48.00	VI
Inadequate linkage with research institutes	75.00	III	86.67	II

*Multiple responses

sources and triangulate the information with other sources. Similarly Mohammadi (2002) reported significant relationship between age, level of education and years of experience with information seeking behavior of extension personnel in Iran. Idiake-Ochei et al (2016) also reported that extension personnel with higher education tend to seek for information more than the less educated workers.

Constraints in obtaining information

It is the extension agency through which the information is disseminated to the aqua farmers for adoption (Bahal et al 1992). Hence it is imperative to study the difficulties faced by the extension personnel in obtaining information for updating themselves for onward dissemination to the farmers.

The constraints faced by the respondents in the present study (Table 5) revealed that majority of the respondents (83.33%) in public extension service had less time to seek information from various resources. They spent their time on works related to administration, regulation and welfare activities. More than three-fourth of the respondents reported that less exposure to trainings (80.00%) and inadequate linkage with research institutes (75.00%) were the major constraints in obtaining new information. About one-third of the respondents felt that the research publications were not specific to field problems (70.00%) and it was difficult to interpret the technology recommendations from research publications (66.67%).

Lack of access to on-line resources, irregularity in receiving printed materials and lack of skill in translating scientific information into extension language were reported as constraints in obtaining information by 58.33, 36.67 and 8.33 per cent of the respondents respectively. The results are in line with the work of Ozowa (1995), Adesoji et al (2006) and Sobalaje et al (2019) who reported that non-availability of relevant information and inadequate latest information sources lead to poor information seeking behaviour. It is also to note that the library which is a collection of information stored, organized and made ready for use was not available or fully consulted by the respondents.

In case of private extension personnel majority of the respondents (88.33%) felt that lack of time was the major constraint in seeking new information. Private extension personnel were given target by their company. They had to contact large number of their client farmers everyday and hence they did not have time to seek information. More than three-fourth of the respondents reported that inadequate linkage with research institutions (86.67%), non-relevancy of research publications to field problems (85.00%) and difficulty in deriving technological recommendations from research publications (80.00%) were the major constraints in obtaining information for them. These findings are in line with the results of Suresh et al (2012) and Sobalaje et al (2019) which stated that the ability of information sources to meet the information needs and reliability of the information sources were the major

Table 6. Perceived constraints of extension personnel in performing extension work

Component	Public extension personnel (n= 60)*		Private extension personnel (n= 60)*	
	%	Rank	%	Rank
Technology: Availability of technology suitable for extension to farmers	25.00	XI	68.33	IV
Obtaining information: Adequacy of information flows from researchers to extension workers	88.33	IV	85.00	II
Feedback: Adequacy of information flows from aqua farmer to extension workers	85.00	V	71.67	III
Technical skills: Extension personnel's practical skills in absorbing new technologies	41.67	IX	36.67	V
Extension skills: Extension personnel's skills in teaching and communication	33.33	X	33.33	VI
Mobility: Adequate transport for extension personnel to visit farmers	96.67	II	0.00	IX
Facilities: Teaching and communication facilities for extension personnel (projectors, classrooms, telephones etc)	83.33	VI	25.00	VII
Teaching aids: Availability of teaching materials, printed materials, demonstration kits etc	81.67	VII	20.00	VIII
Manpower: Inadequate manpower to carry out extension activities	100.00	I	8.33	X
Organization: Works related to non-extension duties	91.67	III	0.00	XI
Motivation/rewards: Payment (moral and material) not received for performing extension duties	56.67	VIII	91.67	I
Budget: Inadequate funds for execution of extension activities	100.00	I	0.00	XI

*Multiple responses

factors influencing the choice of information sources. About half of the respondents reported that irregularity in receiving print materials (56.67%) and lack of access to online e-resources (48.00%) were the major bottlenecks in obtaining new information. Inadequate opportunity for training to update knowledge and lack of skill in translating scientific information into an understandable language were reported as the constraints by 35.00 and 500 per cent of the respondents respectively.

Constraints in performing extension work

In public extension service inadequate manpower and fund provision to carry out extension were the major constraints reported by all the respondents (100.00%) followed by inadequate transport facility to visit farmers' ponds (96.67%) (Table 6). More than three-fourth of the respondents felt that lack of information flow from research to extension (88.33%), feedback from aqua farmers to extension (85.00%), inadequate extension material (83.33%) and teaching aids (81.67%) were the major hindrances in performance of their extension work. Further lack of motivation, lack of skills in absorbing new technologies and communicating the learned information to the farmers were reported to be the constraints in performing extension work by 56.67, 41.67 and 33.33 per cent respondents respectively. One-fourth of the respondents (25.00%) reported that lack of availability of suitable technology for extension to farmers was the constraint in performance of their extension work.

In case of private extension personnel lack of motivation for performing extension duties was reported to be the major constraint by majority of the respondents (91.67%). More than three-fourth of the respondents reported that lack of information flow from research to extension (85.00%) and feedback from aqua farmers to extension (71.67%) were other major hurdles in performing extension duties. About two-third of the respondents (68.33%) reported non-availability of suitable technology for extension to farmers as one of the constraints in performing duties. Lack of skill in absorbing new technologies (36.67%) and communicating the same to farmers (33.33%) were

the next major constraints expressed by the extension personnel. One-fourth of the respondents reported that lack of teaching and communication facilities was a constraint in performance of extension work while 20.00 per cent respondents felt lack of extension material a constraint. Inadequate manpower to carry out extension work was reported as a constraint by 8.33 per cent of the respondents.

Earlier lack of an appropriate and proper extension network (Jayaraman 1987), unqualified personnel, non-availability of transport and poor working conditions (Sahoo et al 1995), limited funds, facilities and knowledge (Phuong et al 2002), poor funding and poor staffing situation reflecting in low mobility of field staff, poor job motivation and ill-equipped technology demonstration centers (Bolorunduro et al 2004), poor infrastructure facilities, inadequate staff strength and lack of access to research publications for field work (Patel et al 2016), suitable training material and lack of farmers' problem-oriented research (Madhavan et al 2016) were reported to be the major constraints in performance of extension work.

CONCLUSION

The findings of the study brought the fact on the information flow in coastal aquaculture wherein the private extension personnel were the primary information source for farmers on every aspect of farming. Further from the information seeking behaviour of both public and private extension personnel it was confirmed that the state extension systems lacked regular linkage with research institutions and universities for capacity building and feedback.

The findings on trainings, constraints in information seeking and bottlenecks in providing extension work were also substantiated that knowledge sharing and collaborative linkage were absent between the researchers and extension personnel at present. The pooled correlation results revealed that age, higher education, vast experience and more participation in training programmes would facilitate the respondents in accessing the important information sources and triangulate the information with other sources. The findings of this study can be useful for policy makers while designing the policies for effective aquaculture extension system.

The study showed that in order to strengthen the public extension system the government should recruit young fisheries/aquaculture graduates for aquaculture extension work as younger and higher educated extension personnel tend to seek more information which in turn would be disseminated to the end users ie aqua farmers. Adequate funding or sponsorship should be made available for participation of extension personnel in conferences and workshops which would provide a platform for them to learn latest aquaculture development. Proper linkage of aquaculture extension institutions with universities and research institutes should be ensured to minimize the process in getting information from such sources. At the same time better information communication tools need to be made available at reasonable cost to make information sources attractive.

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