

Bridging the research-extension-farmer-input and market linkage gap in coastal aquaculture through application of ICT

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The primary objective of agrarian extension services is to enhance the standard of living of the farming community by enhancing their technical capacity and facilitating their access to information, inputs, services and market. Extension personnel ought to be an enabling family friend of farmers who need to facilitate the farmers not only in farming but in other frontiers such as education and the health of the family. Because of this broader role extension is being known as a means for community/rural development and not an end in itself. In order to achieve this noble objective the extension system has been adopting time-tested approaches to reach and help the end users. However, there is no 'universal one best-fit magical approach' available which can be adopted every where and hence, context specific extension approaches need to be adopted considering the socio-economic, technical, agro-ecological and resources profile of the end users.

In order to be effective extension personnel need to be supported with periodical capacity building to update their technical skill and knowledge, required extension materials, resources and budget. Similarly the extension system is expected to portray the real requirements and scenario at the field level so that demand driven technical practices can be generated, tested and given to the farming community and other end users at different levels. Likewise the extension personnel need to have linkage with input providers to help the farmers to access quality inputs and monitor the input producers for adherence to quality standards. Similarly to understand the market demands, quality expectations and market intelligence a strong linkage with the buyers is also essential. Therefore the research, extension, inputs, farmer and market systems should have a 'give and take' interaction at required intervals to know each other's requirements and attempting to accomplish the demands of each other. This needs a vibrant institutional linkage mechanism involving research, extension, farmer, inputs and market.

In India, aquaculture is a livelihood for more than 14 million people and also an important constituent of major foreign exchange earning, contributing about 1 % of the total GDP and 5.39 % of the GDP from agriculture sector of the country for the year 2010-11 (DAHDF, 2012). Globally, India ranks second in the aquaculture with a production of 4.65 million tonnes with a share of 8.72% (FAO, 2012). Indian coastal aquaculture in the strict sense is synonymous with shrimp culture which is being carried out in about 1,500,000 ha with a production of 2,200,000 tonnes. Most of the shrimp produced are exported and hence quality of the produce is important. Shrimp aquaculture is a knowledge-intensive and high-investment farming enterprise that requires constant communication of information between the research, extension, inputs, market and farmer subsystems to bring out practical solutions to deal with emerging production and farm management related issues.



Studies on the information sources of the aquaculture farmers and extension personnel have clearly indicated that the linkage between the research, extension and farmers are inadequate (Kumaran et al. 2004; 2008 and 2011). The orientation of the fisheries department per se is towards the popular development schemes and hence, efforts towards extension service providing technical support for aquaculture rather inadequate. Further, a formal linkage interface mechanism in the form of research-extension interface meetings, pre-crop and post-crop conferences at the regional level to integrate the research, extension, farmer, inputs and market sectors is non-existent in the Indian fisheries sector and it is unlikely that a mechanism to facilitate such a linkage will be put in place in the near future. In the absence of a vibrant REF linkage for a two way communication and capacity building it is important to look for an alternative strategy. In the era of information revolution, information and communication technology (ICT) aided tools could offer a solution to address this gap and capacity strengthening (ADB, 2003; Richardson, 2003).

ICT Approach for bridging the REFIM Linkage

Information and communications technology is a broader term inclusive of the existing and continually evolving computer and electronic gadgets and software, digital broadcast and telecommunication technologies, television, radio, mobile phones, electronic information repositories such as the World Wide Web and audio-visual content stored in compact discs. It also includes the policies and laws that govern these media, services and devices. The availability of several telecommunication networks and service providers means that the majority of our end users have access to more than one medium and interactive mode. The rapidity and reach of information services at low cost are the unique advantages of ICT. Therefore ICT has the potential to bridge the REFIM linkage gap.

ICT aided initiatives for aquaculture extension in India

Aquaculture is a technology driven farming enterprise and the aqua farmers are looking for quality information in time at an affordable cost. ICT aided tools like e-publications, compact discs, short films, mobile telephony, phone-in programmes, information kiosks, expert systems and decision support systems have been developed and implemented in a limited scale as projects or programmes. Some of the initiatives are detailed below.

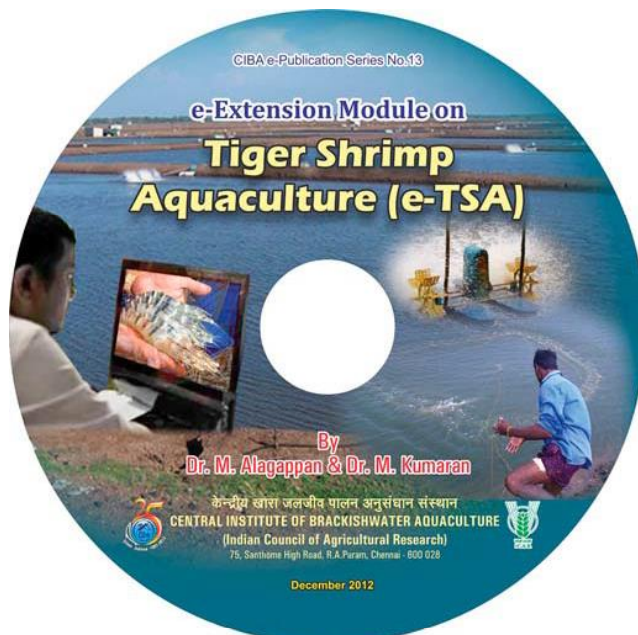
1. The 'Phone-in' Programme (PiP): PiP is an e-initiative and service facility where farmers/fishermen can call and record their queries on a given telephone number. They would be called back and provided the required information. At the time of live interaction, they can ask further questions to the experts at the station and get replies to their queries immediately. The Central Institute of Brackishwater Aquaculture in collaboration with M.S. Swaminathan Research Foundation have been undertaking PiPs on better management practices of shrimp farming and sea bass culture and its farm management practices to educate the farming community.
2. Farmer-friendly touch screen information kiosk on BMPs in shrimp culture: An information kiosk with touch screen facility on BMPs of shrimp culture in Tamil language was developed and dedicated to the small scale farmers of Nagapattinam district in Tamil Nadu. In addition to the BMPs, the schemes of various fisheries development departments, contact numbers of inputs and buyers were also provided in the kiosk.
3. Technology dissemination through mobile phones: Mobile phones are the most important medium through which short messages on farming and related aspects can be communicated to the farming community as well as extension workers. Based on a detailed information need assessment the subject matter is made as short technical messages and were disseminated via SMS for the officials



IA Call Centre.

of Department of Fisheries of states and farmers in vernacular languages. It was proved that the quantity and quality of the services and the speed of services delivery have been improved significantly through mobile phones for extension services (Xiaolan Fu and Shaheen Akter, 2012). MobiAqua of A.A Biotech Pvt. Ltd a Chennai based private entrepreneur has been linking the inputs, farmers and market through mobile phones.

4. Village/ Rural knowledge Centre: The Village/ Rural Knowledge Centre is the initiative of M.S. Swaminathan Research Foundation to help ensure food security. The centre provide the rural communities access to a variety of information in fostering agricultural and allied sectors through a hybrid wireless network comprising computers, telephones, VHF duplex radio devices and facilitating both voice and data transfer (Adhiguru and Mruthyunjaya, 2004). It also provides information regarding fish density in the ocean to the fishers.
5. Kisan Call Centre: The Department of Agriculture & Cooperation (DAC), Ministry of Agriculture, Govt. of India has been implementing Kisan Call Centres across the country to deliver extension services to the farming community in 24 x 7 basis. Any farmer using the toll free number can request for technical service on any subject in a local language. Frequently asked questions in aquaculture have been developed and given to the hub centre for disseminating them to the farmers.
6. e-Sagu Aqua: e-Sagu Aqua is an ICT based tool for personalised aqua-advisory system (Vimala et al., 2009). It aims to improve farm productivity by delivering high quality personalised (farm-specific) aqua expert advise in





touch screen information kiosk.

a timely manner to each farm at the farmer's doorstep. A community worker sends the photograph of the crop for advice through e-mail and the advice sent back with in 24 hours. The community workers download the advice and pass it on to the farmer. The aquaculture extension services are extended through ICT tools like database, internet and digital photographs.

7. Aqua-Choupal: The Aqua-Choupal a web supported initiative to provide market and farming related information to enhance farmers' productivity and their farm-gate price realisation (Kumaran et al., 2010). This approach revolved on a network of information units called Aqua-Choupal equipped with a computer connected to the internet, located in villages. Through Aqua-Choupal, farmers could access information on weather, scientific farming practices and market price. Aqua-Choupals also facilitate the supply of farm inputs to the farmers as well as purchase of shrimps at their doorstep. This was the initiative of the Indian Tobacco Company.
8. e-TSA: The extension module on Tiger Shrimp Aquaculture (e-TSA), an expert system for knowledge management and dissemination of Better Management Practices (BMP) of tiger shrimp (*Penaeus monodon*) (Alagappan and Kumaran, 2012). Information on BMPs has been covered under ten headings, viz., site selection, pond design and construction, pond preparation, seed selection and stocking, feed management, water quality management, health management, waste water management, harvest and post harvest management, and shrimp farm bio-security. The e-TSA also assists the user in identifying a shrimp disease and its management through selection of symptom(s) provided in the system, apart from assisting in calculation of lime, fertiliser, chlorine and daily feed requirement for shrimp farming activity.
9. e-publications: Farmer advisories, success stories, market information and important field related findings which need to be informed to the end users immediately are being uploaded as e-publications in the websites of the institutions concerned. However, the viability of this medium largely hinges on regular updation and continuity.

A specific interaction corner for posting questions and sharing of field information would make it more mutual and interactive.

10. Short video-films: Short duration video-film on different aspects of brackishwater aquaculture are being produced especially in local languages and disseminated to the end users. CIBA has produced video films on BMPs of shrimp farming, shrimp seed production, feed production and setting up of aquaclinics, ornamental fish farming, brackishwater aquaculture based livelihood programmes for women self-help groups.
11. Decision Support Systems: Systems that can aid carrying capacity based aquaculture planning in a given creek, multi-criteria based site selection tools for brackishwater aquaculture site selection have been developed by CIBA.
12. Information dissemination through FM radios: Local FM radio channels could be a powerful medium to disseminate technical information in local languages and it can be an interactive one. FM radios can be activated in some mobile phones. The Tamil Nadu Fisheries University is developing a FM radio based advisory for the aquaculture farmers in the Karaikal region of Pondicherry UT and adjoining districts of Tamil Nadu.
13. Social network media - Facebook: Social websites such as Facebook are being used for aquaculture technical information in a big way among the face book users. The aquaculture professionals.com a face book site is quite dynamic and it provides the platform for posting field related issues, new practices and diseases for the benefit of aquaculture professionals who are involved in farming and consultancy services.

ICT tools for REFIM Linkage

Application of appropriate ICT tools for a specific target of audience considering their access and comprehension is very important. ICT medium suitable for communication between



research and extension may not be fit for farmers. Therefore, the ICT medium should be receiver oriented and stakeholders need to use tools accordingly. Based on the field experience a tentative model list of ICT tools which can be used for REFIM linkage is presented in the figure. In order to make the application of ICT tools for extension service successful and effective the following requirements are essential:

- Periodical capacity building for updation of technological content for the extension personnel.
- A dedicated subject matter specialists (SMS) team at the district/regional level.
- Capacity building on selection and use of ICT tools for an appropriate subject.
- Necessary infrastructure like network, hard ware and software.
- Adequate budget.

Conclusion

ICT has the potential to bridge the research- extension-farmer-inputs - market linkage gap in coastal aquaculture. The pilot scale initiatives implemented has shown a positive impact. Though several initiatives have been taken on the application of ICT in fisheries and allied farming sectors in India most of them are taken up in a limited scale. To make the information transfer more efficient, it is high time to apply ICT tools for aquaculture extension service with dedicated technical teams built in each institution exclusively for the purpose. A mission mode ICT programme for extension service integrating research-extension-farmer-inputs and market need to be planned and implemented at the State level for technology dissemination in fisheries sector.

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