Open sea cage culture in India- A sociological perspective

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Introduction

Marine cage culture is the latest innovation in Indian mariculture scenario. The first cage was demonstrated in Visakhapatanam in 2007-08. The logic of the floating cage culture technology is the conversion of marine space into a controlled production system. This entails a number of socio-political issues apart from the technological ones. Prominent among them is the changing context of marine tenure in the country. This paper analyses such issues based on a preliminary study conducted in some of the locations where the cage demonstration has been implemented. The major sociological framework employed in the analysis is that of the Actor –Network Theory (ANT) proposed by Latour (2007). Thus the methodological objective was to explore the actor- networks at different locations using participatory protocols.

The idea of cultivating fish in the open sea through cages is of recent origin. Open sea cage culture is being posed as an answer to increasing demand for food in the context of the declining yield trend shown by capture fisheries (especially when the Chinese catch excluded) and the problems faced by the land based – aqua farming technology. The pioneers in this technology are countries like Norway, Japan and USA. After about three decades of intense research and development activities cage culture has become a mature industry in these countries (Grottum and Beveridge 2007). In the Asian region, China has attained significant strides in off shore cage culture. Within the span of a decade (1990-2000) and with an investment of more than US$10 million, China has deployed about 4000 such cages yielding about 2 lakh tons (Chen and Chen 2008).

India's entry into the arena of off shore cage culture is very recent and this marks a significant milestone in the mariculture pursuits of the country. The history of mariculture research in India dates back to early seventies when pioneering attempts were made by CMFRI to farm mussels in the inshore waters using lines. Though the technology was successfully demonstrated, it did not capture the imagination of the fisher folk for reasons obvious. The major stumbling block was the absence of a "culture mindset" which was partly due to resource abundance amenable to exploitation through capture fisheries. With the capture fisheries production leveling off in the recent years the potential for the open sea cage culture is huge. The success demonstrated at Visakhapatanam has come as a shot in the arm to our mariculture aspirations.

Objective and methodology

It is in this context that the present study was undertaken to assess the perception of the stakeholder constituency

and to reflect on the challenges and prospects of open sea mariculture. The cage culture is a newly introduced innovation and could be either adopted or rejected by the stakeholders. An individual's decision to adopt or reject a new practice passes through several stages, and does not happen at once. Innovation diffusion studies have recognized the adoption/non-adoption of a new introduced practice is influenced by whether or not it matches with the adopters' needs, situation, and perceptions of the innovation (Rogers, 2003).The rate of adoption might differ among individuals depending on his/her level of innovativeness. The more innovative an individual the shorter is the adoption time. Since the innovation is in the nascent stage of adoption it is not possible to draw of picture of its diffusion. The perception of people on the probability of its adoption, which is mainly determined by innovation characteristics (as defined by Rogers, 2003) only can be assessed now.

The location of the sites where the preliminary study was conducted is depicted in Table1. It also shows the current status of the culture in these sites. As it can be seen some of the sites one demonstration was over and in other places the first series of demonstration was in different stages of operation. There was continuous access to all the operations at Munambam which was covered during (9/12/08 to 18/04/09).

A notable feature of the innovation transfer model being attempted across the sites is the way in which the various agencies and institutions are integrated. The dominant mode is that of Public-Private Partnership. The table below gives an over all view on this aspect.

Table 1 Sites of open sea cage culture visited

Site	State,district	Distance from cmfri centre	Status of cage	remarks
1. ChaumukhBaliapal	Orissa, Baleswar/ Balasore	From Viskah, about 700km	Cage installed in the sea, 4000 fingerlings of sea bass stocked	Very good cooperation from the fisheries department and the fisher folk
2.Visakhapatanam	AP, Visakah	About 5km	Second cage *P monodon* stocked	The fishermen group has gained more confidence
3.Iskapalli	AP, Nellore	About 200 km from Chennai	-Two cages installed-Modifications done to stock *P. monodon* and lobsters	Fisher folk evince keen interest
4.Pulikat	Tamil Nadu,	About 50 km from Chennai	Ready for stocking lobsters Good support from the	NGO and fisher folk. Fishers more interested as this is the second time
5.Munambam	Kerala	About 30 km from Kochi	Harvest done	Pre mature harvest due to drifting of cages; growth parameters promising
6.Vizhinjam	Kerala	About 18 km from Thiruvananthapuram		Harvest done

Table 2 Modes of institutional arrangements

Site	Mode	Details
ChaumukhBaliapal(orissa)	PPP	Society of the traditional fisherfolk+State Department of Fisheries+CMFRI+NFDB
Visakhapatanam (AP)	do	Fishermen society +lead role by a fisherman leader+DF+CMFRI+NFDB
Iskapalli,Nellore(AP)	do	Fishermen society +lead role by a fisherman leader + DF+ CMFRI+ NFDB
Pulikat, Chennai (TN)	do	Fishermen society +NGO +DF+CMFRI+NFDB
Munambam		Fishermen group +CMFRI+NFDB
Vizhinjam		do

Perception of stakeholders

Perceived attributes of an innovation such as relative advantage, complexity, compatibility, trialability, and perceived risks have been used extensively in previous innovation studies to evaluate innovation adoption. (Rogers 1983) defines relative advantage as 'the degree to which an innovation is perceived as being better than the idea it supersedes'. Complexity is defined as 'the degree to which an innovation is perceived as relatively difficult to understand and use']. Trialability is defined as 'the degree to which an innovation may be experimented with, on a limited basis' Compatibility is defined as 'the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopter'. Perceived risk is defined as the degree to which an innovation is perceived to be economically risky.

The stakeholders in general showed enthusiasm towards the innovation in all the locations. Though this is encouraging it needs to be qualified with the facts that the demonstrations are being carried with financial support to the stakeholders. But the real litmus test is their willingness to adopt the innovation entirely on their own. When this question was asked on a Likert type scale the responses obtained were revealing. The * sign indicates the perception before the demonstration and $ indicates the same after the demonstration. Visakahpatanam was found to be more positive on this count.

Table 3 Perceived adoptability across locations

	1(Blsr)	2(vsk)	3(nlr)	4(plkt)	5(mnmbm)	6(vzj)
High		$				
Medium	*	*		$	$	$
Low			*	*	*	*

(High-above 75% of response, Medium-50-75% Low –below 50%)

Though high initial cost is a perceived deterrent across the locations, the Visakhapatanam group was optimistic to get financial assistance through the Tsunami assistance fund of the Government. In Balasore, the group was willing to put operational expenditure provided the cage was given to them.

It is to be noted that the demonstration is just in progress in Balasore. Nevertheless the stakeholders here have a much more favorable perception towards the innovation. This could be because of certain socioeconomic peculiarities of the village like backwardness, homogeneity of the group, and the presence of a culture mindset owing to the fact that almost all the fishermen families possess farm lands for cultivation. The fishermen in the west coast (represented by two sites) was found to be a bit reserved as only medium response was obtained on this count. This must be read in tandem with their perception on innovation characteristics which was found to be low on

Another remarkable observation is the increase in level of confidence shown by the fisherfolk after the demonstration of the technology in one season.

When the perceived innovation characteristics were considered the pattern obtained has been deputed below. The response was not collected from the two places where the demonstration was not completed. The innovation characteristics registered a better perception in Visakhapatanam. This could be due to many facts like

a) the positive impact due to the success of the first demonstration
b) the role played by Mr Polanna who happen to be the leader of a state level fishermen association
c) better accessibility to technical advise and supervision from CMFRI
d) higher innovativeness of the group

Table 4 Perceived innovation characteristics

Innovation characteristic	1(Blsr)	2(Vsk)	3(Nlr)	4(Plkt)	5(Mbm)	6(Vzj)
Relative advantage (high)		$$$		$	$	$
Complexity (low)		$$		$	$	$
Trialability (high)		$$$		$$	$	$
Compatibility (high)		$$$		$$	$	$
Perceived risk(low)		$$		$	$	$

($$$-above 75% Agree, $$-50-75% Agree,$-less than 50% agree)

Prospects and Challenges

Though it is too early to comment on the future of the innovation in the Indian scenario some reflections made in this direction seems not to be out of place. The question is will the technology get adopted and diffused? The answer depends on three major factors a) technological b) socio-economical and c) political/governance. Since the technological factors are being addressed by the concerned persons I limit my discussion to the sociological and political aspects here.

Sociological factors

The major factor that influences the innovation decision process is the extent to which the candidate innovation meets the felt needs of the incumbent adopter. The relative advantage of this innovation has been favouarbly perceived. The fisher folk in general feel that the capture fisheries sustainability is in peril and they are in the look out for alternative livelihood sources. It can be assumed that the cage culture in this aspect has captured their imagination if one goes by the enthusiasm shown by the people. The emergence of a culture mindset is a welcome sign because fishermen are believed to be still in the hunter- gather mindset.

There are push and pull factors behind the adoption of any innovation. One of the major deterrents is the perceived high initial cost. But if the cages are made available to the fishermen group at a subsidized cost it is well likely to be adopted. Attention needs to be given to cost cutting strategies in the cage fabrication. The cost of HDPE cages in China is said to be only Rs600/cubic meter. Another factor is the price they get for the cage-cultured fish. Though high value fishes are being recommended now, their price is dependent on the market vulnerability. Another factor is the delay in the financial reward. Unlike capture they have to wait for about five to six months for the harvest. But compared to the former, cage culture is less risk prone. But fishermen were of the opinion that if the season of the culture is planned in such a way that the harvest synchronizes with the lean season/high demand season like festivals they could earn better price. Since cage culture offers control over the production system possibilities of getting premium price by way of organic certification or other certifications could be explored.

Though threats like poaching or community-agreed vandalism are real they can be remedied if the community is vested with the ownership of the cages. Innovativeness of the fisherfolk need to be tapped to the maximum extent possible in all the aspects like selection of sites, species, feed, cost cutting strategies *etc.*

Political/governance factors

The cage culture being a point of departure against the conventional sense of marine tenure it poses many challenges in this regard. To established ocean users cage culture is a new system of property that regulates access and usage of marine resources. Until recently the ocean was considered to be the last of the commons, where ownership is based on the labour that fishermen invested in the act of catching them. The marine tenure system prevalent in the country, though its enforcement is feeble,

grant rights to fishing territories they do not guarantee that fish would not migrate out of these territories. Until a fish is caught nobody is considered to be a legitimate owner of that fish. The concept of cage culture thus marks a significant departure from this notion. So the need of the hour is to chalk out a suitable marine property rights policy giving due weightage to the rights of the community but not forestalling socially committed corporate bodies in entering the scenario on a Public Private Partnership mode. A system of Public hearing as has been practiced in Hawai (Suryanata and Umento 2002) could be followed in legitimizing commercialization of marine space.

Cage as a new metaphor

There is nothing more puzzling than a proposition that views Open Sea Cages as bridges! But this is the concluding remark I would like to pose. Yes, the cages have started acting as socio-psychological bridges between the marine fisheries R&D and the fisherfolk along the coast of this country. The Indian coastal villages never had such a "bridge' built through their collective psyche, except perhaps the few mariculture interventions done in the late seventies. There always has been an intangible barrier between the fishermen and the kind of scientific knowledge, (especially the stock assessment knowledge which is the main mandate of CMFRI) that has been generated by the researchers. Being relevant only at a wider policy level, there is no wonder that, this knowledge base could hardy capture the imagination of the fisherfolk. They often found the research system as an anathema, informing governments to make policies that went against their immediate interests (like mesh size regulations/ reduction in fishing effort/even the seasonal fishing bans). The scientific advice was deemed to be with a touch of inherent negativity. This has led to the development of an annoying sense of mistrust among the fisherfolk and this has been the biggest communication barrier an extension scientist working in the marine sector has to surmount. No social scientist who has ever experienced the frustrating pangs of establishing a "connection " with the fisherfolk can fail to see the transformation of cages, with its positive image of being a tangible production system innovation, as becoming emotional bridges.

Concluding remarks

It is too early to predict the future of the cage culture in India. The innovation has many challenges as well as opportunities. To tackle the challenges a great deal of discussion, planning and coordination is required to create dynamic networks on a value chain basis. However its fate lies in the collective will, social capital and institutional capacity of a number of agencies and institutions involved. The lessons from the countries who are ahead of us could be of much use in terms of not only the technology but also the marine farming governance. The demonstrations being undertaken in different parts of the country needs to be viewed in the perspective of Multi Locational Trials and there is an urgent need to convert such collective knowledge into location specific policies, norms, networks and practices.

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