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# Adoption Behaviour of Fish Farmers in Critical Inland Fish Culture Technologies in Tamil Nadu

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**This study on the factors influencing adoption behaviour of fish farmers towards critical technologies in inland fish culture was carried out during 2009-10 in Thiruvarur district of Tamil Nadu. The data were collected using a well structured and pre tested interview schedule from 120 randomly selected fish farmers. The findings revealed that majority (82%) of fish farmers possessed medium to high level of knowledge and more than three - fourth (76%) of them belonged to medium to high level adopter category. The adoption behaviour of fish farmers towards critical inland fish culture technologies was significantly influenced by the factors like, occupation, annual income, land holding, extent of weed infestation, social participation, mass media participation, extension agency contact, cosmopoliteness, innovative proneness, value orientation, risk orientation, economic motivation, knowledge about critical inland fish culture technologies and negatively by their age. Based on the above findings the study recommends more number of knowledge building activities like meetings, discussions, mass media etc., to increase knowledge and thereby adoption of critical inland fish culture technologies. Economic benefits of critical inland fish culture technologies need to be and cosmopolite methods and channels like exposure visits, study tours etc need to be organized. More number of young fish farmers need to be trained in critical inland fish culture technologies.**

**Keywords:** Adoption, critical technologies, inland fish culture, correlation, path analysis.

India is a large producer of inland fish; ranking next only to Japan. With an abundance of freshwater resources, India has still not been able to tap even 30% of the potential area for inland fish production. Both the central and state governments have come up with schemes to help the cause of the farmers. Out of the total inland fish production of over 3.6 million metric tons, more than 60% is contributed by fish culture in ponds and reservoirs. Freshwater fish culture is a very profitable business provided farmers take up this on scientific lines. Inland fish culture is attracting farmers' attention as a means to increase farm income in Thiruvarur District, the rice bowl of Tamil Nadu. Fish has occupied an important place in the global market as a safe and cheap source of animal protein with high consumer acceptability. Tamil Nadu has been playing a significant role in regard to Inland fish culture since time immemorial. Fish being one of the main food items, the demand for fish is very high in the state. Though Tamil Nadu has water resources over an area of 3.17 lakh hectares, the inland fish production is hardly 1.15 lakh metric tonnes per year against the potential of 4.5 lakh metric tonnes, and the state incidentally has higher fish consumers. The contribution of Tamil Nadu to the total production of the country is only about 4.14 percent while the contribution of Tamil Nadu to total consumption of fish food is about 25.54 percent. There is a gap in between production and Consumption. To ensure successful fresh water fish production the inland fish farmers have to adopt certain methods of culture operation.

Adoption was considered as one of the consequences of the innovation, decision process, a decision to adopt an innovation or technological invention which had not essentially been the only terminal stage in the innovation decision process. Adoption of any improved technology involves a process in which awareness is created, attitude is changed and favorable conditions for adoption are provided. Adoption of innovation is a dynamic interactive process to accomplish the needs of the farmers to revive the national economy. Critical Technologies in Inland Fish Culture involves stocking and growing two or more compatible and complementary fish species like, Indian Major Carps (IMC) and exotic carps in a water body like pond to maximize the fish production utilization of all available niches in the pond ecosystem. The most favourite species combination of composite fish culture are catla, rohu, mrigal, silver carp, grass carp, common carp, murrels and fresh water prawns. The

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principle behind the critical inland fish culture technologies is to produce maximum quantity of fish per unit area from a scientifically managed water body by stocking fast growing, economically important, compatible species having shortest food chain utilizing the all ecological niches of the water body. Though fish culture is an age old practice in Tamil Nadu, the adoption behavior of fish farmers towards critical inland fish culture technologies is not known. In fact, hardly any systematic research has done to explore these areas.

Keeping in view the dearth of such studies especially in Tamil Nadu, the present study was under taken with the following objectives:

1. To analyze the adoption behaviour of fish farmers towards critical inland fish culture technologies.
2. To identify the factors affecting the adoption behaviour of fish farmers with regard to critical inland fish culture technologies.
3. To bring out the relationship of socio economic and psychological characteristics of fish farmers with attitude and adoption behaviour towards critical inland fish culture technologies.

**Methodology**

The research was carried out using *ex post facto* research design during 2009-10 in Thiruvarur District of Tamil Nadu. A combination of purposive and systematic random sampling procedures was employed. The District was purposively selected as it has vast and diverse inland fishery resources ideally suited for taking up Inland fish culture. Thiruvarur district predominantly constitutes the Cauvery delta zone and endowed with about 6500 canal fed ponds measuring 0.15million ha without disturbing crop cultivation and in fact supplementing it, fish culture could well be profitably undertaken in the ponds and tanks for at least 6-9 months a year. Though the district has water resources over an area of 1.5 lakh hectares, the inland fish production is hardly 8700 tones against the capacity of about 1.00 tones a year. This is because of the reason that the fish farmers may not have the fish farming in systematic manner. It could lead to the lowest inland fish production. Among the ten development blocks in Thiruvarur district, four blocks namely Thiruvarur, Mannarkudi, Needamangalam and Valangaiman were selected for the study in the consideration of the preponderance of fish farmers among the population. In the selected four blocks, three villages each were selected by considering more number of fish farmers available in the village. Numbers of fish farmers from each village were selected by using proportionate random sampling technique. A total of 120 fish farmers comprising proportionate number from each village constituted the respondents for the study.

The dependent variable adoption behaviour of fish farmers towards critical Technologies in Inland Fish Culture, was quantified by using a partial adoption technique suggested by Sinha and Kolte (1974) with necessary modification and adoption quotient developed by Sengupta (1967). Based on a thorough review of relevant literature and discussion with the experts in the subjects, a total of 24 independent variables having some bearing on the dependent variables were identified for inclusion in the study. These independent variables represented socio personal, socio-economic, communicational, psychological and situational variables of the respondents and were empirically measured by procedures evolved for the purpose, and also by using scales and scoring procedures developed by earlier researchers. The data were collected with the help of well structured and pretested interview schedule developed for this purpose from the respondents through personal interview.

**Results and Discussion**

The distribution of respondents based on their level of adoption towards critical technologies in Inland Fish Culture was shown in Table 1. Majority of respondents (75.84%) belonged to medium to high category of adoption and the remaining to low adoption category. Thus, it implied that majority of the fish farmers of the study area adopted critical technologies in Inland Fish Culture to medium to high extent, which might be due to the fact that most of the fish farmers had correct information and knowledge about critical Technologies in Inland Fish Culture.

Zero order co-relation analysis was carried out between selected socio personal, socio economic, communicational, psychological and situational variables of fish farmers and their adoption behaviour. From Table 2, it was clear that the variables viz., occupation, annual income, land holding, social participation, mass media

**Table 1. Distribution of respondents based on their level of adoption towards critical inland fish culture technologies**

n=120

| Level of adoption | Fish farmers | |
|---|---|---|
| | No. adopted | Percentage |
| Low (up to 66) | 29 | 24.16 |
| Medium (67-78) | 46 | 38.34 |
| High (more than 78) | 45 | 37.50 |

participation, extension agency contact, cosmopoliteness, innovative proneness, value orientation, risk orientation, economic motivation, knowledge about critical inland fish culture technologies, extent of weed infestation had recorded strong and positive bearing on the adoption behaviour of fish farmers towards critical inland fish culture technologies. Age showed negative influence. The other factors studied like caste, family size, family type, education, fish farming

**Table 2. Correlation of different independent variables with the adoption behaviour of fish farmers towards critical inland fish culture technologies as dependent variables**

| S.No. | Independent variables | Correlation coefficient |
|---|---|---|
| A. Socio-personal variables | | |
| X1 | Age | -0.220* |
| X2 | Caste | -0.040 NS |
| X3 | Family size | -0.053 NS |
| X4 | Family type | -0.138 NS |
| X5 | Education | 0.126 NS |
| X6 | Fish farming experience | 0.166 NS |
| B. Socio-economic variables | | |
| X7 | Occupation | 0.208* |
| X8 | Annual income | 0.202* |
| X9 | Land holding | 0.226* |
| X10 | Social participation | 0.239** |
| X11 | Possession of fishing equipment | 0.155 NS |
| C. Communication variables | | |
| X12 | Mass media participation | 0.456** |
| X13 | Extension agency contact | 0.536** |
| X14 | Cosmopoliteness | 0.452** |
| D. Psychological variables | | |
| X15 | Innovative proneness | 0.578** |
| X16 | Credit orientation | 0.023 NS |
| X17 | Value orientation | 0.475** |
| X18 | Risk orientation | 0.410** |
| X19 | Economic motivation | 0.536** |
| X20 | Knowledge about critical fish culture technologies | 0.673** |
| E. Situational variable | | |
| X21 | Size of water body | 0.115 NS |
| X22 | Duration of water availability | 0.061 NS |
| X23 | Source of water | -0.031 NS |
| X24 | Extent of weed infestation | 0.182* |

NS = Non significant;
* = Significant at 0.05 level of probability;
** = Significant at 0.01 level of probability

experience, possession of fishing equipments, credit orientation, size of water body, duration of water availability, and source of water did not influence adoption behaviour of fish farmers to a significant level. These result implied that high adopters of critical inland fish culture technologies would be by their young age and higher levels of annual income, land holding, social participation, mass media participation, extension agency contact, cosmopoliteness, innovative proneness, value orientation, risk orientation, economic motivation, knowledge about critical inland fish culture technologies, extent of weed infestation. It is obvious that younger farmers being more enthusiastic were attracted more towards critical inland fish culture technologies. Hence younger respondents adopted more practices. The finding is similar to those of Talukder and Sontaki (2005).

The occupation of fish farmers was positively and significantly related to adoption of critical inland fish culture technologies. Respondents, who pursue fish culture as primary occupation for supporting the family, were better adopters, as they were completely dependent on fishery for their livelihood. Annual income showed positively significant relationship with adoption of critical inland fish culture technologies. More income of the respondents would help to adopt improved practices and did not hesitate to increase expenditure on purchasing various inputs for fish culture. The finding is in accordance with the finding reported by and Sah and Ramchand(1999). Social participation had significant and positive relationship with adoption level of fish farmers. The reason may be that respondents might have come across new ideas related to critical inland fish culture technologies when they participated in the activities of different social organizations. Present findings are in line with the findings of Meeran (2000). Mass media participation had positive and significant co-relation with adoption of critical inland fish culture technologies. Fish farmers gained more knowledge related to fish culture practices when exposed to different mass media sources. Mass media helped to broaden knowledge and gave a chance to learn about various benefits like training, credit, and subsidy etc. The findings are in conformity with the findings reported by Meeran (2000). A positive and highly significance co-relation existed between the extension agency contact and adoption of critical inland fish culture technologies. It implied that by contact with extension workers, the fish farmers will gain knowledge and help to increase the adoption of different critical inland fish culture technologies.

Cosmopoliteness of fish farmers showed significantly positive relationship with adoption of critical inland fish culture technologies, implying there by that those farmers with higher contact beyond there own social system had more adoption. This finding corroborates those of Venkatesh Prashad and Siddaramaiah (2000) and Talukder and Sontaki (2005). Innovative proneness of fish farmers showed positive and significant relationship with extents of adoption. An individual with high innovative proneness generally have more adoption level critical inland fish culture technologies. Similar findings are reported by Biswas et al. (1991). The risk orientation of farmers was positively and significantly related to extent of adoption of critical inland fish culture technologies. It implied those respondents having higher level of risk orientation are better adopter. The finding is in line with the findings of Biswas *et al.* (1991) and Meeran (2000). The economic motivation of fish farmers was positively and significantly related to adoption of critical inland fish culture technologies. It implied that those farmers have a tendency to maximize their earning and strive towards this end, have higher

**Table 3. Path analysis of selected independent variables with adoption behaviour of fish farmers towards critical inland fish culture technologies**

(n=120)

| Variable | Correlation coefficient | Direct effects | Rank | Total indirect effect | Rank | Variables through which substantial indirect effects are channeled through | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | I | II | III |
| **Socio-personal variables** | | | | | | | | |
| X1 Age | -0.220* | -0.230 | 14 | 0 | 13 | 0.069 | 0.039 | 0.030 |
| X7 Occupation | 0.208* | 0.158 | 7 | 0.062 | 11 | 0.058 | 0.045 | 0.039 |
| X8 Annual income | 0.202* | -0.030 | 9 | 0.230 | 10 | 0.109 | 0.105 | 0.099 |
| | | | | | | (X20) | (X19) | (X9) |
| X9 Land holding | 0.226* | 0.183 | 6 | 0.037 | 12 | 0.087 | 0.074 | 0.050 |
| | | | | | | (X20) | (X19) | (X12) |
| X10 Social participation | 0.239** | -0.058 | 11 | 0.308 | 6 | 0.109 | 0.077 | 0.067 |
| | | | | | | (X20) | (X19) | (X24) |
| **Communication variables** | | | | | | | | |
| X12 Mass media participation | 0.456** | 0.143 | 8 | 0.317 | 5 | 0.134 | 0.108 | 0.103 |
| | | | | | | (X20) | (X19) | (X15) |
| X13 Extension agency contact | 0.536** | 0.270 | 3 | 0.290 | 7 | 0.138 | 0.109 | 0.100 |
| | | | | | | (X19) | (X20) | (X15) |
| X14 Cosmopoliteness | 0.452** | -0.101 | 12 | 0.561 | 2 | 0.183 | 0.165 | 0.142 |
| | | | | | | (X15 ) | (X19) | (X20) |
| **Psychological variables** | | | | | | | | |
| X15 Innovative proneness | 0.578** | 0.345 | 1 | 0.255 | 9 | 0.130 | 0.127 | 0.078 |
| | | | | | | (X19) | (X20) | (X13) |
| X17 Value orientation | 0.475** | -0.097 | 13 | 0.577 | 1 | 0.193 | 0.159 | 0.149 |
| | | | | | | (X19) | (X15) | (X20) |
| X18 Risk orientation - | 0.410** | 0.066 | 10 | 0.476 | 3 | 0.185 | 0.139 | 0.134 |
| | | | | | | (X19) | (X20) | (X15) |
| X19 Economic motivation | 0.536** | 0.276 | 2 | 0.274 | 8 | 0.162 | 0.152 | 0.135 |
| | | | | | | (X15) | (X20) | (X13) |
| X20 Knowledge about Critical fish culture technologies | 0.673** | 0.249 | 4 | 0.421 | 4 | 0.176 | 0.168 | 0.119 |
| | | | | | | (X15) | (X19) | (X13) |
| **Situational variable** | | | | | | | | |
| X23 Extent of weed infestation | 0.182* | 0.198 | 5 | 0.018 | 14 | 0.052 | 0.040 | 0.031 |
| | | | | | | (X20) | (X9) | (X15) |

Residual effect: 0.4352

adoption. The finding corroborates those of Biswas *et al.* (1991) and Talukder and Sontaki (2005). The knowledge level of respondents was positively and significantly co-related to their extent of adoption. When the knowledge of respondents is more, adoption of critical inland fish culture technologies also more (Haque, 1979).

Table 3 presented the path analysis to decompose the total effect of r value into direct, indirect and residual effect of the exogenous variables on the predicted variable i.e. extent of adoption. It was found that the variable innovative proneness had yielded the highest direct effect. It was observed that higher the innovative proneness, the higher had been the extent of adoption. Following this variable, the next variable was economic motivation. Economic motivation of the respondent motivated their tendency to maximize their earnings and ultimately changed their attitude to adopt the critical inland fish culture technologies. It was found that variable knowledge had gone instrumental to channel the highest indirect effect on as many as twelve (12) variables to prove its imbibing and associational role to characterize multi-co-linear nature of this important variable. Innovative proneness, economic motivation and knowledge were found to be dominant factors not only with direct effect on adoption behaviour of fish farmers, but also through which most of the other factors influence through adoption level indirectly. The residual effect being 0.4352, it was to conclude that 43.52 per cent of the variables had been left unexplained. This should further suggest that inclusion of more

relevant and contextual variables could have more variations than what had been in present instance.

## Conclusion

The study revealed that majority of the fish farmers adopted recommended technologies of critical inland fish culture technologies to medium to high extent. Variables like social participation, mass media participation, extension agency contact, cosmopoliteness, innovative proneness, value orientation, risk orientation, economic motivation, and knowledge reflected the strong association and effect with the extent of adoption. The variable knowledge had gone instrumental to channel the highest indirect effect on as many as twelve variables to prove its imbibing and associational role to characterize the extent of adoption. Based on the above findings the study recommends the following to promote large scale adoption of critical inland fish culture technologies to increase fish production as well as their socio economic conditions. More number of knowledge building activities like meeting, discussion, mass media etc., are to be planned and conducted by fisheries extension personnel to increase knowledge and thereby adoption of critical inland fish culture technologies. Economic benefits of critical inland fish culture technologies need to be vividly highlighted to convince fish farmers to adopt critical inland fish culture technologies. Cosmopolite methods and channels like exposure visits, study tours etc., need to be organized by the concerned extension agency. More number of younger fish farmers need to be encouraged in training on critical inland fish culture technologies.

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