A Study on Factors Influencing the Adoption Behaviour of Fish Farmers with Special Reference to Scientific Fish Culture in West Bengal, India

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Abstract

This paper analyses the factors influencing adoption behaviour of fish farmers towards scientific fish culture practices in North 24-Parganas district of West Bengal for the data pertaining to the years 2005 to 2008. The data were collected through interview method following a structured schedule from 120 fish farmers selected randomly. Both qualitative and quantitative variables were used for getting results on adoption technique. The findings revealed that the majority of the farmers have obtained medium adoption score (76.57). Twelve variables were found positively and significantly related to adoption level of fish farmers and only two variables (age and caste) were negatively and significantly related. All the psychological variables (except credit orientation), communication variables, occupation, land holding (socio-economic) and size of water body and duration of water availability (situational variables) had positive significant correlation. Most of the socio-personal, socio-economic and situational variables have no bearings with adoption. Technique of Path analysis showed that extension agency contact exhibited highest positive direct effect on adoption behaviour followed by innovative proneness, occupation, economic motivation, knowledge about scientific fish culture. Among the total indirect effects, the highest and lowest impacts were received from the variables cosmopoliteness and caste respectively. Majority of the substantial indirect effects were channelized through economic motivation, family type, occupation, extension agency contact, knowledge and innovative proneness.

1. Introduction

Fish and fisheries have gained considerable importance both as a source of nutrition and as a source of income at various levels- individual, state and national. Fish has occupied an important place in both the domestic and global market as a safe and cheap source of animal protein with high consumer demand acceptability. Development of several suitable technologies coupled with extension activities during the last five decades has helped push Indian fish production manifold occupying the second largest aquaculture fish producer in the world. The fish production has increased from 0.75 million tonnes in 1950 to 6.87 million tones in 2008, a more than nine fold increase (Ayyappan, 2008). At the same time the share of inland fisheries has gone up from 29% to over 50% with production of over 3.3 million tonnes occupying the second position in the world (Ayyappan and Jena, 2006). Presently, the contribution of aquaculture to the GDP is 1.07% (Ayyappan, 2008). The average growth rate of over 6% year^{-1} in the last two decades is the testimony of the potential the sector possesses. The present fresh water aquaculture production of about 2.4 tonnes ha^{-1}, which constitutes about 95% of the total production and about 40% of the total fish production, has been made possible by the phenomenal growth in development of carp farming in small inland water bodies like ponds and tanks (Sarangi, 2006). Even then there still remains a vast potential waiting to be brought under.

West Bengal has been regarded to be an important State to take significant role in fish culture. Fish being one of the main food items, the demand for fish is very high. The present annual fish production is about 11.70 lakhs tones. But the state incidentally is the highest consumer of fish. The contribution of West Bengal to the total production of the country is about 18.28% while the

contribution of West Bengal to total consumption of fish food is about 28.57%. Thus, there remains a gap between supply and demand i.e. shortage of production compared to demand. This information calls for further production to meet up this demand of this high value commodity. So, use of modern technology assumes much more importance. Besides, production is a result of synchronization of various quantitative and qualitative variables which may inter alia include economic, technical, social, individual, environmental, psychological, etc,. Unless and until, these are appropriately matched with the producer-farmers, optimum efficiency in respect of both technical and economic resources will not be achieved.

In view of above, analysis of adoption behavior of fishers and factors responsible for adoption assume a very key role. Adoption of any improved technology involves a process in which awareness is created, attitudes are changed and favorable conditions for adoption are provided. Adoption of innovation is the dynamic as well as the interactive process to accomplish the needs of the farmers. Scientific 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 by fullest utilization of all available niches in the pond ecosystem. The principle behind the scientific fish culture is to produce maximum quantity of fish unit^{-1} 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 (Talukdar and Sontaki, 2005).

Though fish culture is an age old practice in West Bengal, but the adoption behaviour of fish farmers about scientific fish culture practices is yet to be ascertained. Keeping in view of the importance of the aspect in West Bengal, the present study was undertaken with the following specific objectives -

- to examine the adoption behaviour of fish farmers towards scientific fish culture.
- to determine the factors affecting the adoption behaviour of the fish farmers with regard to scientific fish farmers
- to bring out the relationship of selected socio economic and psychological characteristics of fish farmers with adoption behaviour of scientific fish culture.

2. Materials and Methods

The present study was carried out using *ex post facto* research design during 2005-08 in North 24 Parganas District of West Bengal for its vast and diverse inland fishery resources ideally suited for taking up scientific fish culture. A combination of purposive and systematic random sampling procedures was employed for data collection. Among twenty two blocks in the district, following four blocks were selected for the study:

- Amdanga
- Hasnabad
- Habra-I and
- Habra-II

Two villages from each block were selected by simple random sampling technique. A total 120 fish farmers were selected by using proportionate stratified random sampling technique. The data were collected in the structured and pre tested interview scheduled developed through participatory approach.

The dependent variable i.e. adoption behaviour was quantified by using a partial adoption technique suggested by Sinha and Kolte (1974) with necessary modification and adoption quotient developed by Sengupta (1967). The following scores were assigned respectively for full, partial and non-adoption of the recommended practices.

Adoption level	Score
Full adoption	2
Partial adoption	1
Non-adoption	0

The following formula was used to calculate the general adoption level.

After computing individual adoption quotient scores, the

$$\text{Adoption quotient} = \frac{\text{Adoption score of the respondent}}{\text{Maximum adoption score one could get}} \times 100$$

respondents were grouped into three categories (adoption categories) that are low, medium and high categories with mean and standard deviation as measure of check.

A total of 24 independent variables having some bearing on the dependent variable were identified for analysis through the technique of multiple regression analysis. These independent variables represented by socio-personal, socio-economic, communicational, psychological and situational variables of the respondents and were empirically measured by using scales and scoring procedures developed by earlier researchers.

3. Results and Discussion

The distribution of respondents based on their level of adoption is shown in Table 1. The average adoption scores achieved by the low, medium and high categories were 62.2, 79.8 and 88.6 respectively. The results show that almost 82.5% belonged to medium to high adopters categories while the remaining farmers belong to the low adopter category.

It, thus, implied that majority of the fish farmers adopted the scientific fish culture practices which might be due to the fact that most of the fish farmers have correct information and

knowledge. This findings is in conformity with the findings reported by Subash Chandra (1986), Krishnaiah (1989) and Bhaumik et al (1992).

Zero order co-relation analysis was carried out between selected independents variables of fish farmers and their adoption behaviour. Table 2 demonstrates that 14 variables were significantly correlated with the adoption behaviour and 10 variables were found to have non-significant relationship. Family size (X_3), family type (X_4), education (X_5), fish farming experience (X_6), annual income (X_8), social participation (X_{10}), possession of fishing equipment (X_{11}), credit orientation (X_{16}), extent of weed infestation (X_{24}) had a non significant relationship. Age (X_1), caste (X_2) and duration of water availability (X_{22}) had a significant relationship at 5% level while some other variables such as occupation (X_7), land holding (X_9), mass media participation (X_{12}), extension agency contact (X_{13}), cosmopoliteness (X_{14}), innovative proneness (X_{15}), value orientation (X_{17}), risk orientation (X_{18}), economic motivation (X_{19}), knowledge (X_{20}) and size of water body (X_{21}) showed a highly significant and positive relationship at 1% level. The variables which had a negative and significant relationship included age (X_1) and caste (X_2).

Age was found to have a negative as well as significant relationship with the adoption level of fish farmers since the younger farmers being more enthusiastic were eager to learn and follow scientific technologies. Findings of the study were in the same line with the findings reported by Sujath Kumar (1988), Das et al. (1988) and Talukdar and Sontaki (2005).

Caste is found to have a negative and significant relationship with adoption level of fish farmers. The results imply that backward castes adopt more of the scientific fish culture practices. However the study of Subhas Chandra (1986) contradict the present findings.

A non-significant relationship between fish farming experiences and adoption level of scientific fish culture practices was found. Practice of scientific fish culture in ponds being a subsidiary enterprise, new ideas of fish farming experience do not influence its adoption. Fish farmers have to know more the latest information which can upgrade their knowledge and subsequent adoption. The findings are in line with the findings reported by Mathiyalagan (1997), Nagarajaiah (2002) and Talukdar and Sontaki (2005).

Table 1: Distribution of respondents based on their level of adoption of fish farmers towards scientific fish culture

Adoption categories	Fish farmers		Mean adoption scores
	Frequency	Percentage	
Low	21	17.5	62.2
Medium	76	63.3	79.8
High	23	19.2	88.6

Table 2: Correlation Co-efficient (r) of different independent variables with the adoption behaviour of fish farmers towards scientific fish culture (n=120)

Variable code	Independent Variables	Correlation Coefficient (r)
X_1	Age	-0.190*
X_2	Caste	-0.212*
X_3	Family size	-0.159NS
X_4	Family type	-0.170NS
X_5	Education	0.063NS
X_6	Fish farming experiences	0.124NS
X_7	Occupation	0.368**
X_8	Annual income	0.145NS
X_9	Land holding	0.269**
X_{10}	Social participation	0.146NS
X_{11}	Possession of fishing equipment	0.168NS
X_{12}	Mass media participation	0.370**
X_{13}	Extension agency contact	0.383**
X_{14}	Cosmopoliteness	0.384**
X_{15}	Innovative proneness	0.546**
X_{16}	Credit orientation	-0.047NS
X_{17}	Value orientation	0.385**
X_{18}	Risk orientation	0.277**
X_{19}	Economic motivation	0.468**
X_{20}	Knowledge	0.505**
X_{21}	Size of water body	0.241**
X_{22}	Duration of water availability	0.215*
X_{23}	Source of water	-0.155NS
X_{24}	Extent of weed infestation	-0.025NS

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

The results reveal that occupation had a positive and significant relationship with the adoption level. Respondents who pursued fish culture as primary occupation were better adopters for their dependencies on fishery for livelihood. The results suggested that more efforts may be made by extension personnel. These findings remained similar with the findings reported by Mahandra Kumar (1996).

The results indicated a non-significant relationship between the annual income and the adoption level which implied that annual income had no influence on the adoption level. Mohammed Rafi (1993) and Shivasankarappa (1995) also reported the same findings.

Estimate of the size of land holding showed a significant positive

relationship with the adoption level. The findings of Reddy (1997), Nagaraj et al. (2000) and V. Prasad and Siddaramaiah (2000) corroborated the results of the present study.

Mass media participation of the fish farmers had a positive and significant correlation with the adoption. Fish farmers acquired more knowledge of fish culture practices from different sources mass media. It also gave them a chance to learn about the useful role of training, credit and subsidy, etc. These findings were in with the results of Sujath Kumar (1988), Das et al. (1988), Mathiyalagan (1997), Nagaraj (1999), Nagaraj et al. (2000), Meeran (2000) and Nagarajaiah (2002).

Findings showed that the adoption level of the respondents was is significantly influenced by their contacts with the extension agencies. This contact helped increase adoption. The findings were substantiated with the works as reported by Subhas Chandra (1986), Bhaumik et al. (1992), Nagaraj et al. (2000), Meeran (2000) and Nagarajaiah (2002).

The farmers who came in contact with the social system outside had better opportunities to interact, exchange ideas and share experiences with other people. An individual having a higher cosmopoliteness, managed an enterprise in a cost effective manner of with an eye for profit maximization and thus, more adoption as evident from the estimate. The findings of the present study get support from the works of Mahandra Kumar (1996), Chandrakala and Eswarappa (2001), Nagarajaiah (2002) and Talukdar and Sontaki (2005).

Innovative proneness has a good role with the adoption level. Innovative proneness is related to the willingness of an individual to accept the changes leading to the adoption of innovative ideas and practices of scientific fish culture. An individual with a high innovative proneness has generally a higher orientation towards risks. Scientific innovation and competition in the market economy influenced the extent of his adoption. Similar findings were reported by Biswas et al. (1991) and Nagarajaiah (2002).

Credit orientation and adoption level had a good relationship but not so prominent as evident from the estimate. It revealed that irrespective of credit orientation, fish farmers adopt scientific fish culture practices. As most of the fish farmers are economically not sound. They had to obtain credit for procurement of necessary inputs. But commercial banks showed apathy not to consider fish culture as a commercially viable enterprise for advancing credit. Present findings were in line with the findings of Sujath Kumar (1988), Mathiyalagan (1997) and Nagaraj (1999).

Value orientation had a positive and highly significant relationship with the adoption level of the fish farmers. Risk orientation of the fishers got much more advantage for adoption of any technology. This was evident from this study also. Biswas et al. (1991), Krishnamurthy (1997), Nagaraj (1999), Meeran (2000) and Nagarajaiah (2002) also found same results. It can be concluded that the respondents having a higher level of risk orientation are better adopters. It was rather interesting to note that fish farmers adopted scientific fish culture in spite of its inherent risk of the enterprise.

Economic motivation is the key for success of any enterprise. A positive and highly significant relationship between economic motivation and the adoption level of the fish farmers was found out. Economic motivation further ensures inducement of other motives including psychological to adopt more productive and profit oriented strategies. Hence a significant relationship between economic motivation and extent of adoption was anticipated. Findings of Biswas et al. (1991), Nagarajaiah (2002) and Talukdar and Sontaki (2005) established the same fact.

The knowledge level of the respondents have a positive role for adoption. Here, in this study, it was of no exception. The combination of knowledge of scientific and economic orientation enhanced the prospects of a viable enterprise. The findings were in accordance with the findings reported by Talukdar and Sontaki (2005).

The size of the water body (fish culture pond) and duration of water availability had a significant relationship with the adoption behaviour of the fish farmers. It implied that the size of the water body had a capacity to prompt towards adoption of scientific fish farming. The present findings were in conformity with the findings reported by Krishnaiah (1989), Mahandra Kumar (1996). However, findings reported by Subhas Chandra (1986), Nagarajaiah (2002) and Talukdar and Sontaki (2005) explained the fact in different ways.

Table 3 presents the path analysis to decompose the total effect of "r" value i.e. co-relation co-efficient into direct, indirect and residual effect of the exogenous variables on the predicted variable i.e. extent of adoption. The ranking of variables based on their direct effect revealed that extension agency contact (X_{13}), innovative proneness (X_{15}), occupation (X_7), economic motivation (X_{19}), knowledge about scientific fish culture (X_{20}) occupied the first five ranks. Cosmopoliteness (X_{14}), value orientation (X_{17}), risk orientation (X_{18}), mass media participation (X_{12}), size of water body (X_{21}) occupied the first five ranks which had the highest total indirect effect on adoption. Out of 69 substantial indirect effects, 16 effects were routed through the variable of economic motivation (X_{19}), 7 effects each through family type (X_4), occupation (X_7), extension agency contact (X_{13}) and knowledge (X_{20}), 6 pass through innovative proneness, 5 passed through age (X_1), 4 each gone through value orientation (X_{17}) and credit orientation (X_{16}), 3 got pass through cosmopoliteness (X_{14}), 2 found its road through educa-

Table 3: Path analysis of selected independent variables with adoption behaviour of fish farmers towards scientific fish culture practices

Variable code	Variables	Correlation coefficient, r	Direct effects	Rank	Total indirect effect	Rank	Variables through which substantial indirect effects are channeled through I	II	III
X_1	Age	-0.190	-0.224	20	0.034	17	0.091(X_4)	0.0988(X_{15})	0.050(X_7)
X_2	Caste	-0.210	0.115	7	-0.325	23	0.129(X_7)	0.075(X_5)	0.049(X_4)
X_3	Family size	-0.160	0.063	11	-0.223	22	0.209(X_4)	0.076(X_1)	0.067(X_{19})
X_4	Family type	-0.170	-0.379	23	0.209	10	0.082(X_{13})	0.058(X_{16})	0.054(X_1)
X_5	Education	0.060	-0.192	18	0.252	8	0.108 (X_{15})	0.089(X_{16})	0.076 (X_{19})
X_6	Fish farming experiences	0.120	-0.045	14	0.165	13	0.169(X_7)	0.080(X_{19})	0.076(X1)
X_7	Occupation	0.370	0.359	3	0.011	19	0.064(X_{19})	0.058(X_{13})	0.041(X_2)
X_8	Annual income	0.150	0.119	6	0.031	18	0.119(X_{19})	0.086(X_{17})	0.083(X_{20})
X_9	Size of land holding	0.270	0.111	8	0.159	14	0.092(X_{19})	0.078 (X_{20})	0.072(X_{17})
X_{10}	Social participation	0.150	-0.116	16	0.266	7	0.148(X_4)	0.105(X_{20})	0.089(X_1)
X_{12}	Mass media participation	0.370	0.068	10	0.303	4	0.205(X_{13})	0.131(X_{20})	0.116(X_{19})
X_{13}	Extension agency contact	0.380	0.411	1	-0.031	20	0.098(X_{19})	0.094(X_{14})	0.083(X_{20})
X_{14}	Cosmopoliteness	0.380	-0.204	19	0.584	1	0.192(X_{15})	0.189(X_{13})	0.165(X_{19})
X_{15}	Innovative proneness	0.550	0.399	2	0.151	15	0.131(X_{19})	0.102(X_{20})	0.098(X_{14})
X_{16}	Credit orientation	-0.050	-0.277	22	0.227	9	0.080(X_4)	0.062(X_5)	0.061(X_{19})
X_{17}	Value orientation	0.390	-0.172	17	0.562	2	0.214(X_{19})	0.152(X_{13})	0.148(X_{15})
X_{18}	Risk orientation	0.280	-0.093	15	0.373	3	0.202(X_19)	0.110(X_{20})	0.102(X_{14})
X_{19}	Economic motivation	0.470	0.306	4	0.164	12	0.172(X_{15})	0.131(X_{13})	0.120(X_{17})
X_{20}	Knowledge	0.510	0.243	5	0.267	6	0.168(X_{15})	0.150(X_{19})	0.140(X_{13})
X_{21}	Size of water body	0.240	-0.042	13	0.282	5	0.150(X_{19})	0.086(X_7)	0.079(X_{17})
X_{22}	Duration of water availability	0.220	0.030	12	0.190	11	0.085(X_1)	0.070(X_{19})	0.054(X_7)
X_{23}	Source of water	-0.160	-0.242	21	0.082	16	0.061(X_4)	0.039(X_7)	0.036(X_{16})
X_{24}	Extent of weed infestation	-0.030	0.096	9	-0.126	21	0.171(X_4)	0.083(X_{16})	0.075(X_7)

Residual effect = 0.486

tion (X_5), one made a passage through caste (X_2) (Figure 1). The residual effect was estimated to be 0.486 which indicated that 48.6% of the variables had been left unexplained. This finding suggested that inclusion of more relevant and contextual variables could have more variations.

Extension agency contact, innovative proneness, occupation, economic motivation, knowledge, cosmopoliteness and value orientation were found to be the most dominant factors not only as factors having direct effects on the adoption behaviour but also the issues through which most of the other factors influence the adoption level indirectly. So, by considering these dominant variables, the adoption behaviour of farmers can be manipulated. These results were in strong conformity with the findings of stepwise multiple regression analysis.

4. Conclusion

The findings of this study, thus, showed that extent of adoption of recommended technologies of scientific fish culture practices in the area under study was moderate to high. Both qualitative and quantitative factors were found to have relevancy in studying adoption behavior. Some variables had both direct and indirect effects of adoption. The variables like extension agency contact, innovative proneness, occupation, economic motivation, knowledge were found to be the dominant factors to influence the adoption level directly. These variables also acted on other variables to influence the level of adoption indirectly which was substantiated by path analysis. Based on these findings, it was, therefore, suggested that the policy makers and extension functionaries may make adequate use

of various teaching methods effectively for raising the level of knowledge on different aspects of scientific fish culture in consultation with all stakeholders. This would certainly ensure the high adoption level of scientific fish culture which, in turn, would help upgrade the quality of life of fishers.

5. References

Ayyappan, S., Jena, J.K., 2006. On a fast tract of development. Survey of Indian Agriculture 2006, The Hindu143-147.

Ayyappan, S., 2008. Fish for diversified agriculture. In: Proceedings of the Third National Conference on KVK, Div. of Agril. Extension, ICAR, 166-170

Bhaumik, U., Pandit, P.K., Karmakar, H.C., 1992. Adoption behaviour of fish farmers towards composite fish culture. Journal of Inland Fisheries Society of India 24(1), 50-55.

Biswas, A., Acharjee, S.K., Haque, M.A., 1991. Adoption of composite fish culture in the context of some psychological orientation. Environment and Ecology 9(3), 661-663.

Chandrakala, H.T., Eswarappa, G., 2001. Knowledge and adoption of dairying practices of farm women in relation to their socio-personal characters, Karnataka. Journal of Agricultural Science 14(1), 95-100.

Das, P., Bhaumik, U., Pandit, P.K., Roy, B., Banerjee, B.K., Mondal, S.K., 1988. Some variables contributing to the adoption of composite fish culture innovations. In: Proceedings of the First Indian Fisheries Forum, Asian Fisheries Society, Mangalore, 467-470.

Krishnaiah, N.V., 1989. A study on effectiveness of short duration training programme conducted by FFDA in Andhra Pradesh. M.Sc. (Ag.) thesis (Unpub.), ANGRAU, Hyderabad, India.

Krishnamurthy, K., 1997. A study on knowledge and adoption of improved dairy management practices by farmers trained by Rudsell, Chitradurga. M.Sc.(Ag.) thesis (unpub.), U.A.S., Bangalore, India.

Mahandra Kumar K., 1996. Communication behviour of fish farmers in Tamil Nadu, Ph.D. thesis, CIFE, Mumbai, , India.

Mathiyalagan, P., 1997. Acceptance pattern of poultry farm practices. Maharashtra journal of Extension Education 16, 100-103.

Meeran, N.M., 2000. Influence of socio-personal, socio-economic and socio-psychological characteristics on the adoption behaviour of shrimp farmers. Journal of Extension Education 11(2), 2742-46.

Nagaraj, K.H., 1999. An analysis of yield gap, technological and constraints in groundnut production, Ph.D. thesis (Unpub.), U.A.S., Bangalore, India.

Nagaraj, K.H., Lalitha, B.S., Lalitha, K.C., 2000. Relationship between selected characteristics of groundnut growers and their adoption towards groundnut technology. Current Research 29, 29-30.

Nagarajaiah, C.S., 2002. A study on knowledge attitude and extent of adoption of composite fish culture practices in south Karnataka. Ph.D. thesis (Unpublished). Central Institute of Fisheries Education, Versova, Mumbai-400061, India.

Reddy, P.V., 1997. A study on the entrepreneurial characteristics and farming performance of fish farmers in Nellore district of Andhra Pradesh, Ph.D. thesis (Unpub.), ANGRAU, Hyderabad, India.

Sengupta, J., 1967. A simple adoption scale for selection of farmers for high yielding varieties programme on rice. Indian Journal of Extension Education 3(1), 107-115.

Sinha, P.R.R., Kolte, N.V., 1974. Adult education in relation to agricultural development-An evaluation study of a development block in Andhra Pradesh, NIRD, Hyderabad, India.

Subhash Chandra, R., 1986. Consequences of adoption of fish culture practices by fish farmers, M.Sc. (Ag.) thesis (Unpub.), TNAU, Coimbatore, India.

Sujath Kumar, N.V., 1988. Adoption behaviour of traditional fishermen and trawler owners-A comparative analysis. M.Sc. (Ag.) thesis, TNAU, Coimbatore, India.

Talukdar, P.K., Sonataki, B.S., 2005. Correlates of adoption of composite fish culture practices by fish farmers of Assam, India. The Journal of Agriculture Sciences 1(1), 25-27.

Venkatesh Prasad, G., Siddaramaiah, B.S., 2000. Correlates of plant protection measures. Indian Journal of Extension Education 26 (3&4), 124-133.