Original Research Article Relationship between Scientific Management Practices Followed by Fish Farmers with their Socio-Economic Profile Characteristics

ABSTRACT

This study investigates the relationship between the adoption of scientific management practices by fish farmers and their socio-economic profile characteristics in the Raichur district of Karnataka, India. Using an ex-post-facto research design, data were collected from 120 fish farmers across eight villages. The results indicate that 36.28% of farmers adopted scientific management practices at a medium level, while 33.72% and 30.00% reported low and high adoption levels, respectively. Key socio-economic factors influencing adoption included education, social participation, extension orientation, and mass media utilization. These findings underscore the need for targeted interventions to enhance adoption rates and improve fish farming productivity, thereby supporting rural economies. This revised abstract maintains the essential details while improving clarity and focus.

Key Words: Fish farmers, Scientific management, profie, Relation, Association

1. Introduction

Agriculture in India plays a major role in economic development. Besides crop production, fruit and vegetable production, animal and fish production also plays great role in meeting the food needs of the country. Among livestock production, fish farming is one of the oldest occupation of man and he learnt fishing much before he could learn something about agriculture. It was presumably developed by early farmers as one of the many primary production systems to stabilize food supplies. Fisheries sectors have been playing an important role in the national economy in improving food supply, employment and it contributes 1.10 per cent to national GDP and 5.15 per cent to the agriculture GDP. The demand for fish is ever increasing because of its nutritive value, being a rich source of protein. The food insecurity problem in India has been alarming due to the rapid growth of population and the reduction of per capita land available in the country. The current scientific, economic, environmental and social trends are forcing farmer and policy makers to look for viable alternatives to fulfill the nutritional requirement for the growing population. Fish with an average of 18 to 21 per cent protein can be the best alternative in this context. Fish farming practices also hold promises for many small farmers and have the potential significant benefits for strengthening the rural economy.

After China, India is the world's second-largest producer of inland fisheries. The previous 50 years have seen significant advancements in Indian fisheries, with an average yearly production of 6.40 million tons. Commercial freshwater fishing activities are referred to as inland fisheries. Fish are cultivated in a pond or other controlled setting and harvested when the appropriate size is reached in fish farming. The Indian economy greatly benefits economically from its inland fisheries. The development of inland fisheries and the growth that goes along with it can be used to address a variety of issues, including

nutrition and food supply, income and employment opportunities, investment facilitation, mosquito control and suitability for environmental education and scientific research. When compared to other states in the nation, Karnataka ranks sixth for marine fish output and ninth for inland fish production. With inland water resources of all kinds, Karnataka accounts for around 9.30% of all inland water resources in the country. This comprises 5.60 lakh ha of inland waterways, which are made up of 5,813 km of rivers and 2.93 lakh ha of large and small tanks and reservoirs with an area of 2.67 lakh ha. As a result, the state offers enormous potential for inland fisheries growth [2].

The state's geographical features, which include a large expanse of woodland and steep terrain, restrict the potential for horizontal aquaculture growth. The state must become more self-sufficient by closing the gap between supply and demand for fish in order to meet the intended goal. Investigating the elements of vertical expansion in fish production must be given the proper priority. Along with that as an alternative to increase production of fish, and multiple studies highlight the need of evaluating the degree of scientific advancement and acceptance of such management practices in various regions of the state. The goal of adopting scientific fish culture or improved fish production techniques is to secure the highest possible biomass of fish per unit area in a scientifically managed body of water. This can be achieved by either choosing a species that grows quickly, is economically significant, is compatible and has the shortest food chain, or by making use of all the ecological niches available in the body of water [4]. The process of embracing new technology is referred to as an innovation decision process, wherein a person goes through stages such as first learning about the innovation, deciding whether to accept it or reject it and ultimately arriving at a firm conclusion [3].

However, the majority of respondents in the research region raise fish for food without applying many scientific farming techniques, which has an undesirable effect on productivity. There are certain scientific management practices for fisheries sector that are specific to each social system. It is well known that breakthroughs in fish farming do not often flow down to the rural populations who practice this type of farming fast or easily. It is critical to evaluate the perceived obstacles to the progress of scientific management techniques in order to properly convey current technologies. The primary obstacle to increased productivity in the fisheries sector is the poor socioeconomic standing of farmers. Other barriers include a dearth of better varieties, inadequate knowledge of fish feeding and improper management techniques. Hence, it is believed that by properly managing certain factors in accordance with the requirements of the fish farmers, the low yields might be raised [16] [18] [7]. Given the unfavorable circumstances that the farmers are facing, the current study was conducted to determine the extent to which scientific management practices have been adopted by fish farmers in the Raichur district. A primary focus of the study was to quantify the extent to which scientific practices have been adopted, as well as to comprehend the relationship between the socio-personal traits of fish farmers and their adoption level.

2. METHODOLOGY

The Ex-post-facto research design was used in the present study because the researcher is having no control over the independent variables which have already occurred. The present study was conducted in Raichur district of Karnataka, India. Total eight villages were selected from four selected taluks based on highest number of community based fisheries farmers in the taluks. From each selected village 15 fisheries farmers who are under a fish farmers community were selected with the help of simple random sampling procedure to make up a total of 120 fisheries farmers for the present study.

For measuring the adoption of scientific management practices, scale with a total of eight components were devised which includes pre pond preparation, pond preparation, pre-release of fingerlings, selection of seedlings and its management, feed management practices, weed management, fish protection management and harvesting and storage. A fifty seven scientific management practices in fisheries production were selected for the study. For all statements the response were collected using 3 points continuum which includes always, occasionally and never. Scoring of 2 for always, 1 for occasionally and 0 for never was considered. The maximum score was 114 and minimum was 0 for the scientific management practices. All the scores were summed up and percentages, frequency were elicited for grouping the farmers into appropriate categories of low, medium and high using mean and standard deviation. Similarly the details of socio-economic profile of respondents were collected and analyzed. For finding out the relationship between scientific management practices and the socio economic profile of the fish farmers Karl perason's correlation coefficient was run in SPSS. Similarly,

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multiple regression analysis was also performed to determine the extent of contribution of socio-economic variables to the level of scientific management practices [5].

Karl perason's correlation coefficient

The value of r can vary from -1 to +1 where, -1 indicates perfect negative and +1 indicates perfect positive correlation. 0 value of r shows no correlation between two variables.

$$r = \frac{n(\sum XY) - (\sum X)(\sum Y)}{\sqrt{\left[n\sum X^2 - (\sum X)^2\right]\left[n\sum Y^2 - (\sum Y)^2\right]}}$$

Multiple regression analysis.

The multiple regression equation fitted was,

Y= a+b1X1 + b2X2 + b3X3 + ----------+bnXn

Where, Y = Dependent variable

Xi= Independent variables, I=1,2,3,……..n

bi = Partial regression coefficient

n = Total number of independent variables.

3. RESULTS AND DISCUSSION

Table 1. Socio-economic profile of Inland Fisheries farmers

(n=120)

Sl. No.	Variable	Category	Fish farmers	
			Frequency	Per cent
1	Age	Young (Less than 30)	10	8.34
		Middle (Between 31 to 49)	83	69.16
		Old (Above 50 years)	27	22.50
2	Education	Illiterate	23	19.16
		Primary school	33	27.50
		High school	39	32.50
		Pre-university	33	15.84
		Degree and above	6	5.00
3	Land holdings	Marginal farmers (Up to 2.50 acre)	38	31.67
		Small farmers (2.51 to 5.00 acre)	59	49.17
		Semi-medium farmers (5.01 to 10.00 acre)	10	8.33
		Medium farmers (10.01 to 25.00 acre)	3	2.50
		Large farmers (Above 25.00 acre)	10	8.33
4	Annual income	Low (Rs.50,000)	42	35.00
		Medium (Rs.50,000-1,00,000)	52	43.34
		High (above Rs.1,00,000)	26	21.66
5	Family size	Low (2-4)	38	31.66
		Medium (5-8)	62	51.68
		High (9-12)	20	16.66
6	Farming experience	Low (Up to 8 Years)	36	30.00
		Medium (9 to 16 years)	46	38.34
		High (17 and above)	38	31.66
7	Experience of	Low (6 – 10 years)	34	28.34

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	inland Fish farming	Medium (11- 15years)	51	42.50
		High (16 – 20 years)	35	29.16
Mean = 12.25 **S.D** = 4.05				
8	Training attended	No training	2	1.67
		One day training	69	57.50
		Two days training	43	35.83
		More than two days	6	5.00
Mean = 3.18 **S.D =** 1.90				
9	Risk orientation	Low	28	23.34
		Medium	54	45.00
		High	38	31.66
Mean = 20.25 **S.D** = 1.24				
10	Scientific orientation	Low	29	24.16
		Medium	51	42.50
		High	40	33.34
Mean = 20.13 **S.D** = 0.88				
11	Social participation	Low	45	37.50
		Medium	52	43.34
		High	23	19.16
Mean = 4.68 **S.D =** 1.85				
12	Extension orientation	Low	33	27.50
		Medium	50	41.66
		High	37	30.84
Mean = 4.47 **S.D** = 2.16				
13	Mass media utilization	Low	32	26.66
		Medium	53	44.16
		High	35	29.18
Mean =5.58 **S.D** = 1.6				
14	Cosmopliteness	Low	16	13.33
		Medium	56	46.67
		High	48	40.00
Mean = 5.20 **S.D** = 0.81				

1. Age

The findings of the study revealed that majority (69.16%) of the fisheries farmers were belonged to middle age group, followed by 22.50 per cent of the fisheries farmers were belonged to high age group and 8.34 per cent of the fisheries farmers were young age fisheries farmers. The highest proportion of the fish farmers were of middle age group category, because the middle age persons are having more awareness about improved fish farming practices compared to old and young fisheries farmers. (Swetha *et al*. 2020).

2. Education

Education is one of the significant factor that influence on knowledge. The educational status of the fisheries farmers indicated that 32.50 per cent of fisheries farmers had high school education, followed by 27.50 per cent of the fisheries farmers had primary education, 19.16 per cent were illiterate, 15.84 per cent had pre-university and 5.00 per cent were graduates and above. It is fact known that educated persons are more receptive to the modern facts and ideas. As many respondent farmers are with lower education their adoption levels are medium to low. The results is in comparable with the result of [10].

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3. Landholdings

With respect to land holding, nearly fifty percent (49.17%) of the fisheries farmers belonged to small farmers category, followed by marginal farmers (31.67%), an equal per cent (8.33%) of the farmers were semi medium and large farmers and only 2.50 per cent were medium farmers. As, most fisheries farmers in the study area were small, many of them faced difficulties in practicing scientific management practices[17].

4. Annual Income

It is apparent that 43.34 per cent of fisheries farmers were in the medium family income (Rs.50,000-Rs.1,00,000). Hence, they had limited access to modern high cost technologies. This is so because income is obviously associated with the purchasing power of an individual. Similar findings were reported by [7].

5. **Family Size**

The data revealed that 51.68 per cent of the fisheries farmers had medium family size (5-8), followed by low (31.66 %) and high (16.66%). As fish farming is highly labour intensive majority of farmers liked to be in a large group and also to have more family members, so that their own family members can be involved in different fisheries activities in order to reduce their labour expenses [6].

6. Farming Experience

From the study it was noticed that 38.34 per cent of the farmers belonged to medium level (9 to 16 years) farming experience whereas, 31.66 per cent and 30.00 per cent of the farmers belonged to high (17 years and above) and low (up to 8 years) farming experience respectively.

7. **Fish farming experience**

It was seen that 42.50 per cent of fish farmers had medium level (11-15 years) of fish farming experience followed by, 29.16 per cent and 28.34 per cent of them had high and low levels respectively. The highest proportion of the fisheries farmers have medium fish farming experience. As the adoption levels increase with increase in experience of fish farming there existed only medium level of adoption levels [10].

8. Training attended

Regarding training, 57.50 per cent of the fisheries farmers had attended one day training followed by, 35.83 per cent of the farmers had attended two days training and 5.00 per cent of the farmers had attended more than two days training. The fisheries department, under fish project activities organized set of trainings to the fish farmers in the area, hence many fish farmers had availed the benefits and adopted scientific management practices accordingly. These result is conformity with those of [6] [11].

9. **Risk orientation**

In case of risk orientation it is apparent that 45.00 per cent of the fisheries farmers had medium level of risk orientation, followed by 31.66 and 23.34 per cent of the respondents having high and low levels of risk orientation respectively. The risk orientation behaviour of the respondents directly impact the scientific management practices adoption levels. (Mohan *et al*. 2020).

10. **Scientific orientation**

It is indicated that 42.50 per cent of fisheries farmers had medium level of scientific orientation, followed by high (33.34%) and low (24.16%) levels respectively. Majority of the fisheries farmers in the research area view the things scientifically because aquaculture is scientific oriented activity which takes proper measures from release of fingerlings to harvesting and storage of the fishes. Similar findings were reported by [13].

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11. Social participation

It was seen that 43.34 per cent of the fisheries farmers had medium level of social participation, followed by low (37.50%) and high (19.16%) levels of social participation. The farmers often came in contact with social system to know the current ongoing issues and have opportunities to interact, exchange ideas and share experiences with other people. Similar findings were seen in [10].

12. Extension orientation

It was found that 41.66 per cent of the fisheries farmers had medium level extension orientation category, followed by high (30.84%) and low (27.50%). It implies that farmers with more participation in extension activities have higher adoption and vice-versa. Participation in extension activities contributes in more than one way and it helps to widen the knowledge. The results are in line with the results of [12].

13. Mass media utilization

Regarding mass media utilization 44.16 per cent of the fisheries farmers had medium level of mass media utilization category. whereas, 29.18 and 26.66 per cent of the fisheries belonged to high and low mass media utilization categories respectively. Fisheries farmers acquired more knowledge of fish culture practices from different sources of mass media like television, radio, newspaper, social media, etc. It also gave them a chance to learn about the useful role of training, credit and subsidy etc. It also provides information about experiences of successful farmers, which strengthens confidence in other farmers to take up scientific management practices or to attempt new technologies [12].

14. Cosmopoliteness

It is revealed that 46.67 per cent of the fisheries farmers belonged to medium cosmopoliteness group. Where, as 40.00 per cent of the respondents were belonged to high group and 13.34 per cent of the fisheries farmers were low cosmopoliteness group. Nevereless, almost all farmers left home to visit other places more than once and such movements could help them acquire, new ideas, skills and knowledge regarding fish farming which could become the driving tools to improve fish farming practices in their farms. The above findings are in similar to [10].

3.2 Distribution of inland fisheries farmers on the basis of overall scientific management practices adopted.

The data revealed that, 36.28 per cent of the fish farmers adopted the scientific management practices to medium levels, followed by low (33.72%) and high (30.00%) adoption levels of scientific management practices of fish farming.

The most of the farmers were middle aged and has small land holding, medium annual income, medium fish farming experience and medium risk and scientific orientation. All these factors contributed for medium to low management orientation and medium adoption levels of scientific management practices. The results are line with the findings of [14] [15] [16].

Table 2. Distribution of inland fisheries farmers according to their overall scientific management practices (n=120)

Sl.No	Category	Fish farmers	
		Frequency	Per cent
1	Low (Mean-0.425*SD)	40	33.72
2	Medium (Mean ± 0.425*SD)	44	36.28
3	High (Mean + 0.425*SD)	36	30.00
	Total	120	100.00
Mean= 65.60		**S.D = 5.78**	

Note: S.D = Standard deviation

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3.3 Relationship between profile characteristics of fisheries farmers with scientific management practices.

Results depicted that among 13 independent variables, four variables namely, education, social participation, extension orientation and mass media utilization were noticed with positive and significant relationship at five per cent level of significance, Whereas land holding, annual income, farming experience, experience of inland fish farming, number of training attended and risk orientation had positive and significant relationship at one per cent level of significance with scientific management practices. The reaming variables namely age, scientific orientation and cosmopoliteness did not establish any significant relationship with their scientific management practices.

Table 3. Relationship of profile characteristics with the scientific management practices of fish farmers

Sl. No.	Variables	Correlation coefficient ('r' value)
1	Age	0.035^{NS}
2	Education	0.202*
3	Land holding	0.386**
4	Annual income	0.419**
5	Farming experience	0.298**
6	Experience of inland fish farming	0.233**
7	Number of Training attended	0.543**
8	Risk orientation	0.311**
9	Scientific orientation	0.071^{NS}
10	Social participation	0.192*
11	Extension orientation	0.232^{*}
12	Mass media utilization	0.233*
13	Cosmopoliteness	0.074^{NS}

***Significant @0.05 percent, ** Significant @0.01 percent, NS- Non significant**

3.4 Multiple regression analysis different independent variables with scientific management practices of inland fisheries.

The step-wise regression analysis was undertaken to determine the extent of contribution of profile characteristic on scientific management practices of the respondents. The results revealed that, 58.00 per cent of the variation in the scientific management of the respondents was caused by independent variables included in the study. R^2 value of 58.00 with significant 'F' value 11.82 revealed the significance at one per cent level of regression equation. Of all the independent variables, annual income (1.024), farming experience (1.122) were found to be significant 5.00 per cent level. Whereas fish farming experience (0.316), social participation (0.637), extension orientation (0.645) and mass media utilization (0.713) were found to be significant at 1.00 per cent level with scientific management practices by inland fisheries farmers.

It was apparent from the above findings that high contact by the respondents with the extension agents gives them an opportunity to know and discuss about modern methods of fish production practices. Exposure of different mass media media sources like T.V, newspaper and radio helped the fisheries farmers in gaining information regarding recent scientific management practices and it motivated them to take more interest in modern aquaculture practices. Similarly, the annual income of the respondents directly impacts an individuals stability, economic viability and rational behaviour. Therefore, the rise in income levels increases the adoption of scientific management practices. Overall the above significant variables were found to be important in developing better understanding of scientific management

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practices by the inland fisheries farmers and are significantly contributing to the increase in production level of fishes.

Table 4. Association of characteristics of respondents with the scientific management practices of fish farmers.

Sl. No.	Independent variables	Regression coefficient (B)	't' values
1.	Age	0.030^{NS}	0.385
2.	Education	0.400^{NS}	0.667
3.	Land holding	1.112^{NS}	1106
4.	Annual income	1.024*	1.236
5.	Farming experience	1.122*	1.342
6.	Experience of inland fish farming	0.316*	1.332
7.	Number of Training attended	0.075^{NS}	0.106
8.	Risk orientation	2.142^{NS}	1.708
9.	Scientific orientation	0.443^{NS}	0.593
10.	Social participation	0.637**	2.125
11.	Extension orientation	0.645**	2.582
12.	Mass media utilization	0.713**	2.602
13.	Cosmopoliteness	0.526^{NS}	0.810

R^2= 0.580 ; F= 11.82**

***Significant @0.05 percent, ** Significant @0.01 percent, NS- Non significant**

4. CONCLUSION

In conclusion, the study conducted in the Raichur district of Karnataka reveals a moderate adoption of scientific management practices among fish farmers. Several socio-economic factors, such as education, landholding size, annual income, farming experience and access to training, significantly influence the adoption levels. The findings suggest that enhancing these factors could lead to better adoption of scientific practices, thus boosting productivity and economic viability in the fisheries sector. To achieve greater productivity, there is a need for focused efforts on educating fish farmers about modern fish farming techniques and providing them with necessary resources and training. The study emphasizes the importance of scientific orientation, social participation and mass media utilization in promoting advanced fish farming practices.

Overall, these insights provide a comprehensive understanding of the challenges faced by fisheries farmers in adopting scientific management practices and pave way for targeted interventions aimed at bolstering suitable measures and interventions to motivate the farmers to adopted scientific practices. By recognizing the multifaceted dimensions of socio economic characteristics of fish farmers, policymakers and stakeholders can devise more effective support measures to address the identified barriers and leverage the significant variables, for achieving substantial growth in the fisheries sector and contribute more effectively to the rural economy and food security in India.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

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