P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating: 5.04
www.extensionjournal.com

Extension Journal

International Journal of Agriculture Extension and Social Development

Volume 7; SP-Issue 7; July 2024; Page No. 38-43

Received: 02-04-2024
Accepted: 06-05-2024

Indexed Journal
Peer Reviewed Journal

Socio-economic status and constraints faced by shrimp farmers of Raigad district of Maharashtra

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DOI: https://doi.org/10.33545/26180723.2024.v7.i7Sa.794

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Abstract

Shrimp aquaculture play a vital role in the livelihood of millions of people around the world. The present study was carried out to gain information about the socio-economic situation of shrimp farmers, as well as the economic constraints faced by shrimp farmers in the Raigad area. A total of 70 shrimp farms from Alibag, Murud, Shrivardhan, and Mhasala taluka of Raigad district were selected for study with a pre-tested interview schedule. The study found that the majority of shrimp farmers belonged to the middle age group, had 1-5 years of experience in shrimp farming and the majority practiced Hinduism, Maximum shrimp farmers were educated up to graduate level, maximum farmers have the pucca type of house, most of shrimp farmers were having nuclear family and most of the shrimp farmers were having a family size of 1-5 members. Maximum shrimp farmers had annual income between 6 to 10 lakhs. Feed technician was the main source of information (87.15%) for of shrimp farmers and profit was the main source of motivation of shrimp farmers. Initial high investment was the major economic constraint faced by shrimp farmers of the Raigad district of Maharashtra. Shrimp price fluctuation was a major marketing constraint faced by shrimp farmers. Lack of experience was a major socio-personal constraint faced by shrimp farmers. Lack of disease diagnosis laboratory was a major technical constraint faced by shrimp farmers and disease outbreak was a major environmental constraint faced by shrimp farmers of Raigad district of Maharashtra. Shrimp farming provides employment to a large number of the population hence it is important to understand the socio-economic conditions of the shrimp farmers and also what problems they are facing to find necessary solutions to the practices performed by shrimp farmers for their betterment.

Keywords: Shrimp farming, shrimp farmer, socio-personal, constraints, technical constraint Raigad, Maharashtra

Introduction

Fisheries sector has a strategic role in food security, international trade, and employment generation. Fisheries and aquaculture directly or indirectly play a vital role in the livelihood of millions of people around the world. (FAO, 2018) [6]. Indian fisheries sector evolved gradually over the years and has become an important source of food, nutrition, income, and livelihood for millions of people. India is the third largest fish and aquaculture-producing country and accounts for about 16% of total inland and 5% of total global marine fish production respectively. India's total marine and inland fish production stood at 162.48 lakh tonnes, which includes 121.21 lakh tonnes and 41.27 lakh tonnes from inland and marine sectors, respectively. (Handbook of fisheries statistics, 2022) [2]. The fish production in India has increased from 56.56 lakh tonnes in 2000-01 to 162.48 lakh tonnes in 2021-22. Andhra Pradesh, West Bengal, Karnataka, Odisha and Gujarat evolve to be the five major fish-producing states in India during 2021-22 (Handbook of fisheries statistics, 2022) [2].

Shrimp culture in India, till 2009 was synonymous with the monoculture of tiger shrimp, *Penaeus monodon*. Coastal aquaculture in India was predominantly focused on tiger shrimp (*Penaeus monodon*) farming but was inflicted with disease outbreaks leading to the introduction of SPF pacific white shrimp (*L. vannamei*) in the year 2009. Shrimp aquaculture has gained enormous importance after the introduction of *L. vannamei* in culture systems. (Naik *et al*., 2020) [12]. Shrimp have a high protein content, a balanced amino acid profile, unsaturated fatty acids, vitamins, and minerals. White shrimps are one of the most important farmed aquatic crustacean species worldwide and contribute significantly to human nutritional needs. (Vasanthi *et al*., 2021) [25].

In Maharashtra, *L. vannamei* (shrimp) farming is playing a vital role. (Patil and Sharma, 2020) [14]. Shrimp farming can be done under regulated conditions, but there are certain technical and economic challenges. Shrimp producers face a variety of problems, including white spot disease and other viral diseases, low production rates, high production costs, natural disasters such as floods, poaching of shrimps, poor seed quality, high seed rates, and so on.

The present study was conducted to know the economics of shrimp farming. As in shrimp farming various input costs/variables for productivity are feed, seed, fertilizer, medicine, electricity, labour etc. So, to identify what

economic factors in shrimp farming, socio-economic condition of shrimp farmers along with the economic constraint faced by shrimp farmers of Raigad district, this study was conducted.

Materials and Methods

Study area

Raigad district of Maharashtra was selected for the study. In the Raigad district there are total fifteen talukas, for the study purpose Uran (18° 52' 38.046" N and 72° 55' 42.013" E), Alibag (18° 39' 23.954" N and 72° 52' 47.524" E), Murud (18.331° N, 72.960° E) and Shrivardhan (18.059° N, 73.022° E) four coastal Talukas were selected.

Sampling unit and procedure

In Raigad district from the selected four Talukas 70 shrimp farmers were randomly selected for the study purpose. Survey was carried out by collecting the list of shrimp farmers from the Government of Maharashtra's office of the Department of Fisheries, Raigad. The data was collected by personally visiting the shrimp farmer at the farm site.

Interview schedule

The interview schedule had two sections namely socio-economic status of shrimp farmers and the constraints faced by shrimp farmers.

Statistical analysis

Socio-economic status of shrimp farmers

Personal information

In this particular personal information like age, education, religion, gender, family size, family type, marital status, type of ration card, shrimp farming experience, type of house, ownership of farm, source of motivation for shrimp farming, source of information for shrimp farming was collected. Personal information was analysed using frequency distribution table and percentage analysis was used.

Constraints faced by shrimp farmer

Garret ranking technique was used to identify various constraints of shrimp farming. The respondents were asked to identify various constraints affecting of shrimp farming. According to the order of severity, ranks were given by them. Garret ranking technique provides the change of orders into a numerical score. The percentage position of each rank was converted into scores referring to the table given by Garret and Woodworth, 1969 [27].

Garret's formula to convert ranks into percentages is given below:

$$\text{Percentage} = 100 \times \frac{R_{ij}-0.5}{N_j}$$

Where Rij= Rank given for i_{th} factor by j_{th} individual

Nj = Number of factors ranked by j_{th} individual

By referring to the Garrett's table, the percentage positions estimated were converted into scores. The scores of various respondents were added and the mean value was calculated. The factors with the highest mean value were considered to be the most important, followed by second, third and so on. (Jagadeesh, 2015) [24].

The following constraints were faced by shrimp farmers and were ranked in descending order in the study -

1. **Economic constraints:** It consists of problems such as initial high investment, high rate of supplementary feed, high rate of seed, high rate of medicine and chemicals, less financial support from the bank, subsidy, the high-interest rate for loan, self-finance, problem of theft, high transportation cost, scarcity of the hired labour, non-availability of crop insurance and demand of higher wages during peak season.
2. **Marketing constraints:** It consists of problems such as shrimp price fluctuations, less demand in the domestic market, lack of storage facility at pond site, lack of support price system, problem of direct selling to the buyer, emergency crop harvesting, marketing availability and constraints faced in procurement of inputs.
3. **Socio-personal constraints:** It consists of problems such as lack of experience, lack of labour security, lack of cooperation among farmers, employment of unskilled and untrained labour, social nuisance and objection of local peoples.
4. **Technical constraints:** It consists of problems such as lack of disease diagnosis lab, electricity shortages, less availability of quality seed, lack of knowledge, less availability of quality feed, lack of extension network, less technical guidance and Poor water quality.
5. **Environmental constraints:** It consists of problems such as disease outbreak, natural disaster, mangrove degradation, bindings of CRZ, pollution and constraint faced due to geographical situation.

Results and Discussion

Socio-economic status of shrimp farmers

Age

It was found from the study that the majority (68.57%) of shrimp farmers in the Raigad district were belonging to the middle age group followed by (15.71%) were from the young age group (20-30%) and old age group (50 >). Naik (2020) [11] found the same results. Dominance of the young age group (less than 35 years) in shrimp farming was observed by Mohite (2007) [10] and Rawool (2005) [17] in Maharashtra. The dominance of old age group (above 50 years) in shrimp farming was observed by Ponnusamy *et al*. (2004) [15], Swathilekshmi *et al*. (2005) [26] and Salunkhe (2020) [20]. The most likely reason for the results mentioned above is that middle-aged shrimp farmers have more financial freedom and responsibility than younger ones. They may make personal choices for putting their ideas into action.

Religion

It was observed that the majority of the shrimp farmers (90.50%) are with Hindu religion, followed by Muslims (10.50%) and Christians (0.00%). A similar type of results was reported by Sen and Roy (2015) [21]. According to Jagadeesh, 2015 [24], the majority of shrimp farmers were Hindu. The reason behind the dominance of Hindus may be that the majority of the people from the Konkan region belong to the Hindu religion.

Caste
The result showed that other backward classes (OBC) were the maximum category (60%) among shrimp farmers, and general category (OPEN) consists of 21.43%. S.K Sahu (2018) [19] reported that 45.5% of the total sampled shrimp farmers were belonging to the general category and only 6% belonging to the OBC category.

Educational status
Results indicated that in the Raigad district 36.25% of shrimp farmers were educated up to the graduate level followed by secondary level of education (10%), primary level of education (2.5%). The same result was found by Naik, (2020) [11]. Durai *et al*., (2020) [5] showed that the majority (44.67%) of shrimp farmers had higher secondary education, followed by collegiate (22.67%) and only 6.67% were illiterate. Rajarajan, (2017) [16] found that 41% of shrimp farmers were middle school level, followed by 12th pass out (33%), and 20% were graduates and above. Shrimp farmers' educational level can play a vital role in effective management and operation, as well as successful shrimp farming. Educated shrimp farmers can take risks in order to maximize profits and may have entered this sector. This suggested that education is the most important factor in running a successful shrimp farm.

House
It was observed that in the Raigad district of Maharashtra, majority of shrimp farmers (91.45%) had pucca type or category of house, followed by semi-pucca type or category of house (8.55%), and none of the shrimp farmers were having kachcha type of house.

Family type
It was found that in the Raigad district of Maharashtra, 54.29% the shrimp farmer was living in the nuclear family type and rest were in the joint family type (45.71%). Similar results were reported by Naik (2020) [11] in the same region. Rajarajan, (2017) [16] found that 67% of shrimp farmers had nuclear families and 33% had joint families, similar results were found by Ojha (2021) [13]. The findings showed a widespread preference among shrimp farmers for nuclear families, where decision-making is quicker and easier than in joint families.

Family size
It was found that in the Raigad district of Maharashtra the shrimp farmers with family sizes of 1-5 members were 58.57%, followed by 5-10 family member size group (21.43%) and rest of 20% of shrimp farmers were having of 10 – 15 family member size group. Swatilekshmi (2005) [26] reported 57.50% of shrimp farmers had family size up to 5 and 42.50% had a family size of more than 6.

Experience in shrimp farming
It was observed that in the Raigad district of Maharashtra about 42.86% of shrimp farmers had experience between 1-5 years, followed by 35.71% of shrimp farmers had experience of 10-15 years of experience, and 21.43% of shrimp farmers had 5-10 years of experience. Naik *et al* (2020) [12] reported that 28.81% of shrimp farmers had 1–5 years of experience, 49.15% of shrimp farmers had 6–10 years of experience, and 11.86% of shrimp farmers had 11-15 years of experience. Vadher and Manoj (2014) [28] found that 74% of shrimp farmers had 0-5 years of experience and 26% were having experience more than five years.

Annual income
It was observed that the annual income of 48.57% of shrimp farmers is between 6 to 10 lakhs, followed by shrimp farmers with annual income between 1–5 lakhs is 34.29%. The annual income of 11.43% of shrimp farmers was between 11-19 lakh. Only 5.71% of shrimp farmer's annual income was above 20 lakhs. Naik (2020) [11] found that 49.15% had an annual income between 11-19 lakhs, followed by 15.25% of shrimp farmers with an annual income between 6-10 lakhs. Only 10.17% of shrimp farmers had an annual income between 1-5 lakhs. P.S. Swathilekshmi (2005) [26] found that 33.33% of shrimp farmers had a low annual income, followed by 36.67% had medium income and 30% of shrimp farmers were having a higher annual income.

Source of information for shrimp farming
It was observed that in the Raigad district of Maharashtra, feed technician was the main source of information for majority (87.15%) of shrimp farmers. Successful shrimp farmers (12.85%) were the second major source of information. Ojha (2021) [13] found that most of the shrimp farmers (41.67%) consulted the private companies' expert and input suppliers (38.33%) and fishery officers (7.5%). Naik (2020) [11] found that progressive shrimp farmers were the main source of information for 27.71% shrimp farmers. Aqua company technicians were the second major source (25.30%) of information, followed by Internet/social media (17.47%). It may be due to the reason that feed technicians are providing proper guidance for the success of shrimp farming activity and also by telling appropriate feeding strategies and by addressing various problems in culture to the shrimp farmers.

Source of motivation for shrimp farming
It was observed that, profit was the main source of motivation for 71.43% of shrimp farming, followed by friends (14.29%) was the second major source of motivation for shrimp farming, followed by relatives (10%), followed by company (4.29%) and association are (0%) source of motivation for shrimp farming.

Constraints faced by shrimp farmers
Economic constraint
Results showed that initial high investment and high rate of supplementary feed was the major economic constraint faced by shrimp farmers. The high rate of seed was the second most important constraint faced by shrimp farmers of the Raigad district of Maharashtra. Naik (2020) [11] also reported high cost of feed was the first ranked production constraint faced by shrimp farmers of South Konkan region, Maharashtra. Koteshwari *et al*. (2014) [8] and Das *et al*. (2014) [4] also ranked high cost of feed as a major constraint faced by shrimp farmers.

Table 1: Economic constraints faced by shrimp farmers

Sr. No	Economic constraints	Average Garette's Score	Rank
1	Initial high investment	72.57	1
2	High rate of supplementary feed	70.31	2
3	High rate of seed	69.96	3
4	High rate of medicine and chemicals	66.94	4
5	Less financial support from bank	66.93	5
6	Subsidy	60.50	6
7	High interest rate for loan	59.01	7
8	Self-finance	58.61	8
9	Problem of theft	58.31	9
10	High transportation cost	57.51	10
11	Scarcity of the hired labour	57.34	11
12	Non-availability of crop insurance	57.16	12
13	Demand of higher wages during peak season	57.06	12

Marketing constraint

The result showed that shrimp price fluctuations were the major marketing constraints faced by shrimp farmers of Raigad district of Maharashtra. Ojha, (2021) [13] and Jagadeesh, (2015) [24] reported similar results. Rajarajan, (2017) [16] reported shrimp price fluctuation was first ranked constraint and lack of cold storage facility at the pond site was the second ranked marketing constraint faced by shrimp farmers. Naik *et al*. (2020) [12] reported unstable market price as second ranked marketing constraint faced by shrimp farmers.

Table 2: Marketing constraints faced by shrimp farmers

Sr. No	Marketing constraints	Average Garett's Score	Rank
1	Shrimp price fluctuations	72.57	1
2	Less demand in domestic market	70.31	2
3	Lack of storage facility at pond site	69.96	3
4	Lack of support price system	66.94	4
5	Problem of direct selling to the buyer	66.93	5
6	Emergency crop harvesting	60.50	6
7	Marketing availability	59.01	7
8	Constraint faced in procurement of inputs	58.61	8

Socio-personal constraint

Results revealed that lack of experience was the first socio-personal constraint and lack of labour security was second major ranked constraint faced by shrimp farmers of the Raigad district of Maharashtra. Tank *et al* (2019) [23] reported lack of experience among shrimp farming was major socio-personal constraint faced by shrimp farmers. Lack of labour security was sixth ranked production constraint faced by shrimp farmers was recorded by Ojha (2021) [13]. Sahu *et al* (2014) [18] reported that labour scarcity as a 5th ranked constraint (61.66%) in Balasore district and in Puri district it was 13th ranked constraint (20%).

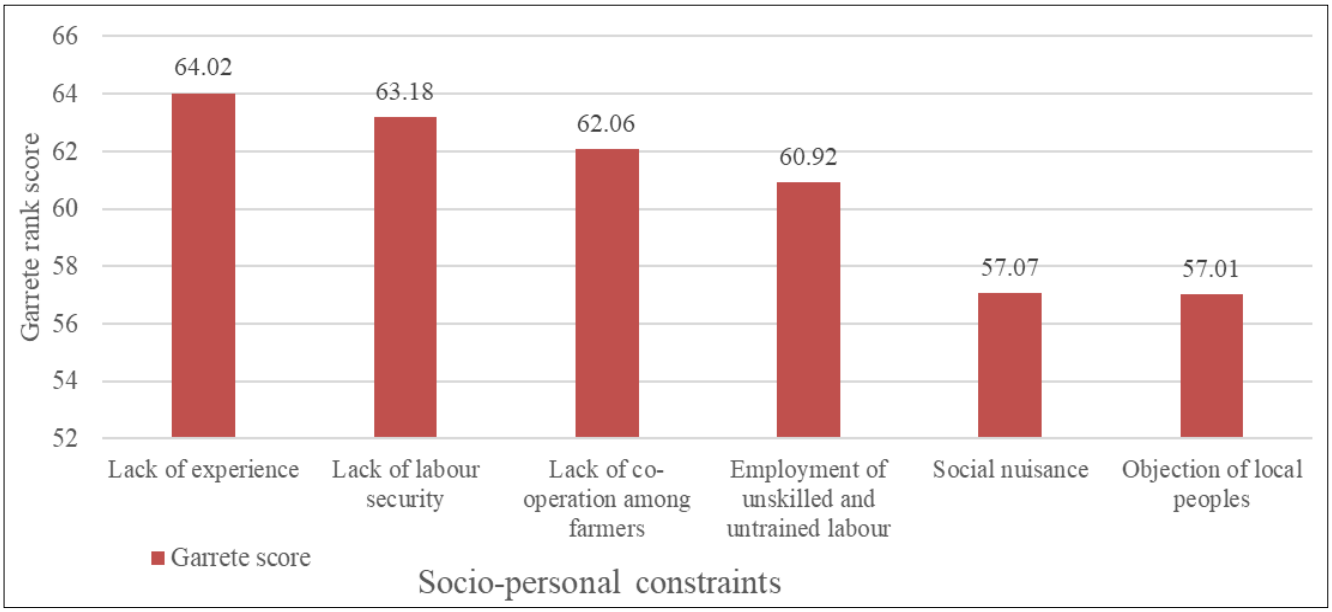

Fig 1: Socio-personal constraints faced by shrimp farmers

Technical constraints

The result revealed that the lack of a disease diagnosis lab was the most important technical constraint faced by shrimp farmers of the Raigad district of Maharashtra. Less availability of quality seed was third major ranked constraint faced by shrimp farmers, followed by lack of knowledge was fourth major ranked constraint faced by shrimp farmers. Jagadeesh (2015) [24] reported lack of quality seed was the first production constraint faced by shrimp farmers. Lack of availability of quality shrimp seed from hatcheries was of great concern to 50% of the farmers reported by Srinivas *et al* (2019). Naik (2020) [11] reported less availability of good quality seed was second major production constraint faced by shrimp farmers. Tank *et al* (2019) [23] reported lack of knowledge as major technical constraint faced by shrimp farmers.

Table 3: Technical constraints faced by shrimp farmers

Sr. No	Technical constraints	Average Garett's Score	Rank
1	Lack of disease diagnosis lab	72.27	1
2	Electricity shortage	68.88	2
3	Less availability of quality seed	68.75	3
4	Lack of knowledge	67.3	4
5	Less availability of quality feed	64.45	5
6	Lack of extension network	63.4	6
7	Less technical guidance	60.47	7
8	Poor water quality	49.22	8

Environmental constraint

Results revealed that disease outbreak in shrimp pond was a major environmental constraint faced by shrimp farmers of Raigad district of Maharashtra. Natural disaster was the second-ranked constraint faced by shrimp farmers. Tank *et al*. (2019) [23] reported disease outbreaks in shrimp ponds as a fourth ranked environmental constraint faced by shrimp farmers. Naik (2020) [11] and Naik *et al*. (2020) [12] reported natural disaster as a second ranked environmental constraint faced by shrimp farmers. Chittem and Kunda (2018) [3] reported WSSV as a major diseased constraint faced by shrimp farmers. Sahu *et al*. (2014) [18] reported that natural disaster was the 8th-ranked constraint faced by shrimp farmers of Balasore (38.33%) and the 12th-ranked constraint faced by shrimp farmers of Puri (20%) district of Odisha.

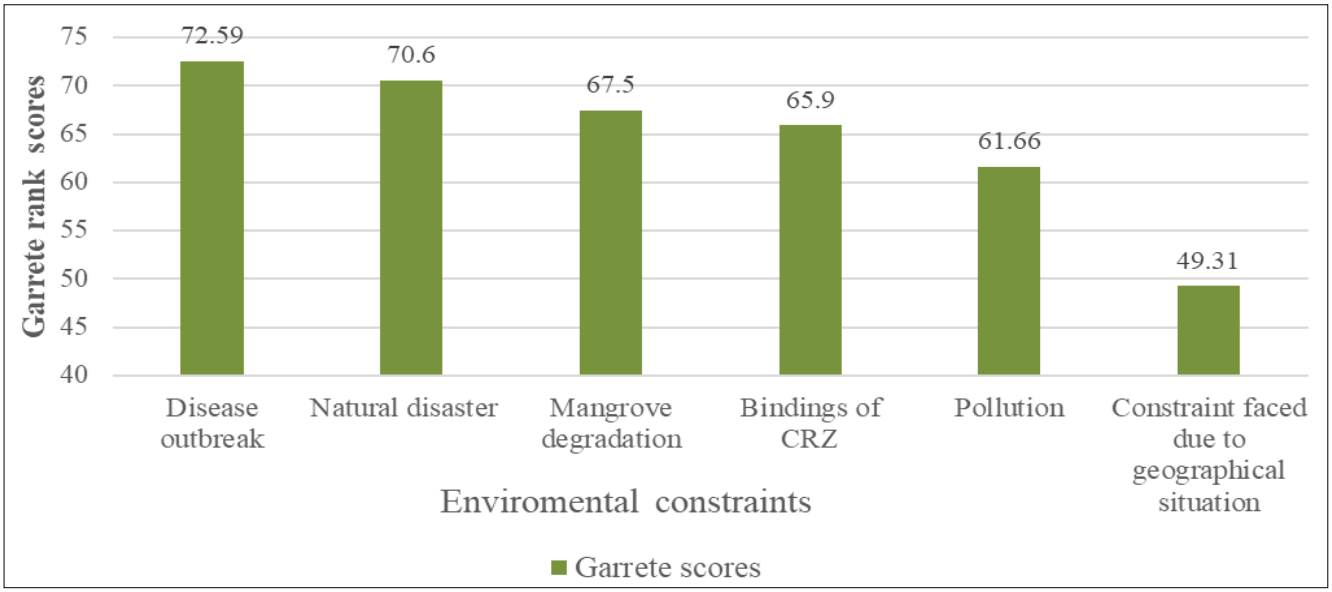

Fig 2: Environment-related constraints faced by the farmers

Conclusion

The socio-economic profile of shrimp farmers is an important subject to research because, it not only influences the farming practices that the farmers use, but it also impacts their performance and outcomes of them. Shrimp farming provides employment to a large number of the population hence it is important to understand the socio-economic conditions of the shrimp farmers and also what problems they are facing to find necessary solutions to the practices performed by shrimp farmers for their betterment. Initial high investment and shrimp price fluctuation was the major economic and marketing constraint faced by shrimp farmers of the Raigad district of Maharashtra. Export of shrimp and shrimp products in India is earning huge foreign exchange hence it is also necessary to improve the shrimp farming practises performed by shrimp farmers.

Acknowledgement

The authors are thankful to the Hon. Vice Chancellor, Dr. Balasaheb Sawant Konkan Agricultural University, Dapoli and Associate Dean, College of Fisheries, Ratnagiri for providing all the necessary facilities to carry out the research work.

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