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RESEARCH PAPER

Constraints analysis of shrimps farming in Karnataka - RBQ approach

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Abstract: Shrimps farming is playing a pivotal role in the socio economic development of India. The state of Karnataka is the seventh largest shrimp producer amongst the shrimp farming states of India and contributed 8.43 lakh tonnes of produce in 2020-21 (MPEDA annual Report, 2021). The present study was undertaken to ànàlyze the constraints analysis of shrimp farming in Karnataka.This study was conducted purposively in Coastal Karnataka in the year 2021. The study was focused on 120 shrimps farmers, 30 petty dealers, 30 wholesalers and 30 retailers. These samples were selected by a simple random sampling method. The data was collected by a personal interview aided by well-structured and a pre-tested questionnaire consisting of 7 major domains of constraints. Rank Based Quotient (RBQ) technique was employed for the allotment of ranking to various constraints. The findings showed that,constraints such as lack of experience (socio personal constraints), lack of technical guidance (technical constraints), high initial investment (economic constraints), diseases outbreak (environmental constraints), lack of quality standards (management constraints), high fluctuation in price (marketing constraints) were the major constraints for farmers and the perishability of the product was the major constraint for marketing intermediary's in the study period. The study suggested that the regulating agencies such as Marine Product Export Development Authority (Anon., 2021c) and developmental departments of government may take appropriate remedial measures to combat the identified constraints for successful shrimp culture in the study area.

Key words: Constraint, Farmers, Rank based quotient (RBQ), Retailers, Wholesaler

Introduction

Shrimps are an important source of many components such as proteins, vitamins, minerals, and omega 3-fatty acids which will help us to protect ourselves from the heart and brain-related problems. Shrimps farming is an aquaculture business that exists in a brackish water environment, producing shrimps for human consumption. The aquaculture sector contributes around 1per cent to India's Gross Domestic Product (GDP) and over 5 per cent to the agricultural GDP (Anon., 2021a). Brackishwater aquaculture, the farming of shrimps, shellfishes and finfishes along the coastal line of the country and in inland saline areas is a vibrant farming sector, under the aquaculture umbrella. The brackishwater aquaculture sector is dominated by shrimp farming and is the economic engine of Indian aquaculture by considering the significant contribution of the sector to food production, employment generation and economic benefits.

Central Institute of Brackishwater Aquaculture (CIBA), Chennai, Tamil Nadu defined brackishwater aquaculture as "The farming of brackishwater organisms, in estuaries, coastline, backwater, lagoons and mangroves *etc.* involving interventions in the rearing process to enhance production including shrimps, sea bass, grey mullet and mud crabs *etc.* is called brackishwater aquaculture". It is also called coastal aquaculture.

The total shrimp production in the world in 2020-21 was 22.50 million tonnes. Ecuador is the world's top shrimp producer, with 30 per cent (6.72 million tonnes) of total shrimp production, followed by India with 24 per cent (5.38 million tonnes). When it comes to shrimp importers, the United States is the largest importer of shrimps which is accounting for nearly 30 per cent (7.00 Million tonnes) of the total exports of India. (Anon., 2021b).

In India, mainly three types of shrimps are commonly reared which are tiger shrimps (*Penaeusmonodon*), white shrimps (*Litopenaeusvennamei*) and scampi shrimps (*Macrobrachiumrosenbergii).* Commercial Shrimps farming started in India during the 1900s with the production of tiger and scampi shrimps whereas white shrimps production started in the year 2009 as a result aquaculture business grew quickly.

There are about 3.9 million ha of estuaries and 0.5 million ha of coastal mangrove areas available in the Country. The estimated brakishwater area suitable for undertaking shrimps cultivation in India is around 11.90 million ha. It is spread over nine states and four union territories out of which 1.23 million ha area is already under shrimps farming which is only 12.96 per cent of the total potential area. Hence, India has a lot of scope in shrimps farming (Marine Product Export Development Authority, Kochi, Kerala. (Anon., 2021c) The total area under shrimp culture in India is 1,66,722.51 ha with a production of 8,43,633 tonnes during 2020-21 (Anon., 2021b). The total shrimp production in India has decreased from 8.5 lakh tonnes in 2019-20 to around 7.5 lakh tonnes in 2020-21, owing to the COVID-19 pandemic and related lockdown, as well as continuing production concerns due to diseases, particularly white spot diseases (Anon., 2021c) West Bengal has the highest area and production of shrimp, followed by Odisha and Andhra Pradesh. The total area under shrimp culture in Karnataka is 3145.39 ha, with a production of 3185.84 tonnes; among the total shrimps, the area under tiger shrimp culture is 2175 ha, with an output of 1050 tonnes. The area under white shrimps is around 970.39 hectares, with a yield of 2185.84 tonnes. In Karnataka, the area under scampi shrimps is insignificant.

(Anon., 2021c) In India shrimp production is drawing attention of stake-holders over a decade continuously and crossed 7.0 lakh tonnes of production in 2021-22. However, more than 87 per cent is exported to the United States of America, China, Japan, European Union, and South East Asia earning a robust foreign exchange to the tune of ₹ 35,000 crores (Anon., 2021c). India can treat this sector as trump card to earn foreign exchange. Moreover, Shrimp farming is gaining importance in recent years due to the increase in the demand in the international market as well as in the domestic market too (reference). In this backdrop, the present study aims at exploring the constraints analysis of Shrimps Farming in Karnataka. The present study helps the shrimps farmers, policy maker to address the constraints with a more holistic approach and immediate preventive measures to be taken to sustain shrimp farming.

Material and methods

The primary data were gathered to fulfill the study's objectives. This study was based on primary data which was collected from 120 farmers, 30 petty dealers, 30 wholesaler, and 30 retailers from the three coastal districts of Karnataka *i.e.* Uttara Kannada, Udupi and Dakshina Kannada from April to May 2022,

Rank based quotient

To find out the importance of problems perceived by the farmers and key informants, "Rank-Based Quotient (RBQ)" was used.

The formula is given below:

$$RBQ = \left(\sum i = \frac{Ln(Fi)(n+1-i)}{Nn}\right) * 100$$

Where,

F_i = Frequency of farmers/key informants for the i^{th} rank of the problem.

N and n = Number of respondents and a maximum number of ranks given for various problems by a farmer among all the contacted farmers, respectively.

Results and discussion

Constraints in the shrimp value chain

The constraint faced by the shrimp farmer during the production and marketing of the shrimp is presented in Table 1. Here, the constraints are divided into seven major constraint categories which are playing a pivotal role in the success of shrimp farming in the study area.

Production constraint in shrimp's value chain

Socio-personal constraints: Socio-personal status plays an important role in shrimp farming. The farmers from Uttara Kannada opined that lack of experience (96.36) was the major constraint faced by them among socio-personal constraints followed by lack of information on technology (80.60), lack of regular training programs (70.90). Farmers from the Udupi responded that lack experience (97.27) followed by a lack of information and technology (80.60), a lack of regular training programs (73.33). Similarly, the respondents from Dakshina Kannada responded that a Lack of experience (90.30) followed by a lack of regular training programs (79.09), a lack of information and technology (73.33). The present study indicated that lack of experience is the major problem among socio-personal constraints so government must take appropriate measures to overcome these problems. A similar results were found by Mailty *et al.* (2019).

Technical constraints

Technical constraints are also the most important constraints for shrimp farmers in the study area. The farmers from Uttara Kannada opined that lack of technical guidance (97.27) was the major constraint faced by them among the technical constraints followed by heavy mortality of hatchery seeds due to poor quality (80.23). Inadequate supply of hatchery seeds in the required time (76.90), Non –availability of quality seed (71.30), low-quality feed (69.36), lack of good water quality (53.53) were listed as other constraints. In Udupi, farmers responded that heavy mortality of hatchery seeds due to poor quality (92.45) was the major constraint followed by lack of technical guidance (79.34), low-quality feed (72.33), inadequate supply of hatchery seeds in the required time (71.34), lack of good water quality (52.60) and non-availability of quality seeds (49.00). Similarly, the respondents from Dakshina Kannada opined that, non-availability of quality seeds (92.39) was the major constraint faced by them followed by lack of good quality water (79.32), heavy mortality of hatchery

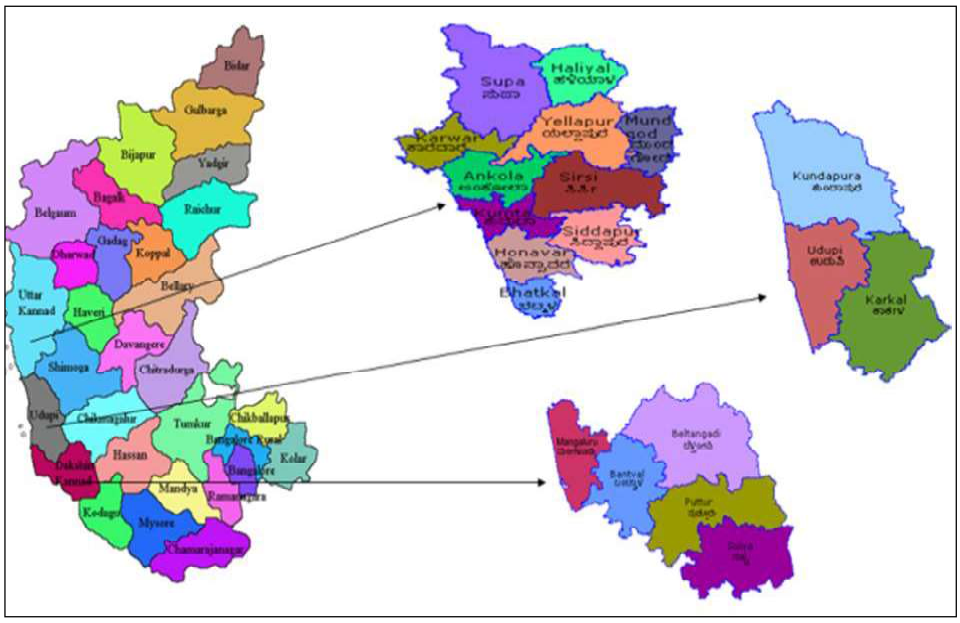

Fig 1: Map depicting the study area

Table 1. Constraints faced by farmers in shrimps production and marketing in the study area

Constraints	Uttara kannada		Dakshina kannada		Udupi	
	RBQ Score	Rank	RBQ Score	Rank	RBQ Score	Rank
I. Production Constraint						
A. Socio-personal constraints						
a. Lack of experience	96.36	I	90.30	I	97.27	I
b. Lack of information on technology	80.60	III	73.33	III	80.60	II
c. Lack of regular training program	70.90	II	79.09	II	73.33	III
B. Technical constraints						
a. Lack of good water quality	53.53	VI	79.32	II	52.60	V
b. Inadequate supply of hatchery seeds in the required time	76.90	III	70.32	IV	71.34	IV
c. Lack of Technical guidance	97.27	I	68.90	V	79.34	II
d. Non-availability of quality seed	71.30	IV	92.39	I	49.00	VI
e. Heavy mortality of hatchery seeds due to poor quality	80.23	II	75.30	III	92.45	I
f. Low quality of feed	69.36	V	51.52	VI	72.33	III
C. Economic constraints						
a. High Initial investment	93.44	I	85.90	II	89.20	II
b. High rate of seed	69.34	V	76.40	IV	71.99	V
c. High rate of supplementary feed	74.60	III	70.90	V	67.90	VI
d. High rate of chemicals and medicine	85.40	II	91.23	I	81.33	III
e. Lack of financial support	70.95	IV	62.11	VII	78.90	IV
f. Problem of Theft	59.20	VII	68.90	VI	60.90	VII
g. Scarcity of the hired labor	64.60	VI	81.22	III	93.45	I
D. Environmental constraints						
a. Natural disasters	83.20	II	79.04	II	83.39	II
b. Disease outbreak	93.20	I	91.03	I	90.20	I
E. Management Constraints						
a. Water management	71.90	V	79.30	III	78.90	IV
b. The problem of bad count	82.90	III	71.90	IV	71.20	V
c. Problem of birds	75.90	IV	65.90	V	81.32	III
d. Quarantine standards	95.40	I	87.40	II	96.70	I
e. Information on export-oriented standards	87.05	II	92.80	I	87.40	II
f. Lack of infrastructure constraint	65.10	VI	59.90	VI	68.60	VI
II. Marketing constraints						
a. High Fluctuations in Price	95.44	I	87.33	II	96.50	I
b. High cost of loading and unloading the produce	82.44	III	78.44	IV	82.55	III
c. High commission charges	82.11	IV	71.22	V	89.22	II
d. Inadequate market information	89.40	II	91.02	I	78.45	IV
e. Transportation problem	78.50	VI	68.30	VI	72.33	V
f. Storage problems	81.20	V	82.33	III	61.33	VII
g. Distance from the market	71.22	VII	61.22	VII	67.44	VI

seeds due to poor quality (75.30), inadequate supply of hatchery seeds in the required time (70.32), lack of technical guidance (68.90) and low quality of feed (51.52). The present study indicated that an inadequate supply of hatcheries is the major problem in the study area among technical constraints. Hence, we have to open a hatchery center near the study area. A similar results were foundin the study conducted by Chittem *et al.* (2017).

Economic constraints

Economic factor plays a crucial role in the adoption of improved technologies in shrimp farming. The farmers from Uttara Kannada opined that high initial investment (93.44) was the major constraint faced by them among economic constraints. The other constraints were high rate of chemicals and medicine (85.40), high rate of supplementary feed (74.60), lack of financial support (70.95), high rate of seed (69.34), scarcity of the hired labor (64.60) and problems of theft (59.20). Farmers from the Udupi responded that scarcity of labor (93.45) was the major constraint among the economic constraint followed by high initial investment (89.20), high rate of chemical and medicine (81.33), lack of financial support (78.90), high rate of seeds (71.99), high rate of supplementary seeds (67.90), and theft (60.90).

Similarly, the respondents from Dakshina Kannada opined that the high rate of chemicals and medicine (91.23) was the major constraint faced by them followed by high initial investment (85.90), scarcity of labor (81.22), high rate of seed (76.40), high rate of supplementary feed (70.90), theft (68.90) and lack of financial support (62.11). The present study indicated that high initial investment is the major problem in the study area among economic constraints. Hence, the

government may take encouragement practices to shrimp farmers by providing financial support. A similar result were found by Dauda and Dasuki (2015).

Environmental constraints

The farmers from Uttara Kannada, Dakshina Kannada and Udupi opined that diseases outbreak (93.20., 91.03., and 90.20) was the major constraint faced by them followed by natural disaster (83.20, 79.04 and 83.39) like cyclone, heavy rain, etc. among environmental constraints. The farmers in the study area were experiencing white spot disease, vibriosis, white fecal matter, *etc.* The reasons behind the diseases were high stocking densities and poor water quality management. These results are aligned with the study conducted by Tank, *et al.* (2019).

Management constraints

The success of shrimp farming often depends on the level of management. The farmers from Uttara Kannada opined that quarantine standards (95.40) were the major constraint followed by information on export-oriented standards (87.05), problems of bad count (82.90), problems of birds (75.90), water management (71.90) and Lack of infrastructure constraint (65.10)among management constraints. Farmers from the Udupi responded that quarantine standards (96.70) were the major constraint followed by information on export-oriented standards (87.40), problems of birds (81.32), water management (78.90), problems of bad count (71.20) and Lack of infrastructure constraint (68.60). Similarly, the respondents from Dakshina Kannada opined that information on export-oriented standards (92.80) was the major constraint followed by quarantine standards (87.40), water management (79.30), problems of bad count (71.90), problems of birds (65.90) and Lack of infrastructure constraint (59.90)were minor among the management constraints. The success of shrimp farming often depends on the level of management. Here the department of fisheries has to impart knowledge about the quarantine standards and other management aspects to the farmers through capacity building programmes like training, method and result demonstration. The same results were aligned with the study of Patil and Sharma (2019)

Marketing constraints of shrimps

The ultimate aim of any farmer is to get a good price in the market. Hence, analysis of marketing constraints is very important for the farmers. Farmers from Uttara Kannada opined that, higher price fluctuation (95.44) was the major constraint and inadequate market information (89.40), high cost of loading and unloading of the produce (82.44), higher commission charges (82.11),storage problems (81.20), transportation problems (78.50) and distance from the market (71.22) were minor among marketing constraints.Farmers from the Udupi responded that high fluctuation in price (96.50) was the major constraint followed by high commission charges (89.22), high cost of loading and unloading of the produce (82.55), inadequate market information (78.45), transportation problem (72.33), distance from the market (67.44) and storage problem (61.33) among the management constraints. Similarly, the respondents from Dakshina Kannada opined, inadequate market information (91.02) is the major constraint followed by high fluctuation price (87.33), storage problem (82.33), high cost of loading and unloading of the produce (78.44), high commission of charge (71.22), transportation problems (68.30) and distance from the market (61.22) among the management constraints.

Higher pricefluctuation was the main constraint in the category of marketing constraints. The price of the commodity is strongly influenced by its demand and it was the same in the case of shrimp. The derived demand for shrimps and its products has been more or less constant in recent decades resulting in more demand for shrimps which in turn has resulted in the poor discovery of shrimp prices. This result is aligned with the study of Pandey*et al.* (2013).

Constraints faced by marketing functionaries in the study area

The constraints faced by the market functionaries were presented in table 2. The farmer in the Uttara Kannada opined that perishability of the product (92.33) was the major constraint followed by lack of storage facilities (87.90), changing consumer behavior and perception (82.33), scarcity of labor (79.09), less no. of processing industries (75.30), high transportation cost (69.30), huge competition (65.30) and problems in processing (61.22). Farmers in the Udupi district also opined that changing consumer behavior and perception about the products of shrimps 91.22) was the major constraint followed by insufficient no. of processing industries (87.44), perishability of the product (81.33), lack of storage facilities (79.45), scarcity of labor (76.66), higher transportation cost (71.22) and problems in processing (65.83). Similarly, the farmer in Dakshina Kannada opined that lack of storage facilities (94.55) was the major constraint faced

Table 2. Constraints faced by market functionaries in the study area

Constraints	Uttarakannada		Dakshinakannada		Udupi		Overall	
	RBQ Score	Rank	RBQScore	Rank	RBQ Score	Rank	RBQScore	Rank
Lack of storage facilities	87.90	II	94.55	I	79.45	IV	87.30	I
Scarcity of labor	79.09	IV	61.22	VII	76.66	V	72.32	V
Insufficient no. of processing industries	75.30	V	82.90	II	87.44	II	81.88	IV
High perishability of the product	92.33	I	79.30	III	81.33	III	84.32	II
Higher transportation cost	69.30	VI	69.93	VI	73.22	VI	70.81	VI
Huge competition	65.30	VII	59.99	VIII	71.22	VII	69.17	VII
Problems in processing	61.22	VIII	76.46	IV	65.83	VIII	67.83	VIII
Changing consumer behavior and perception about the products	82.33	III	72.90	V	91.22	I	82.15	III

by them followed less no. of processing industries (82.90), perishability of the product (79.30), problems in processing (76.46), changing consumer behavior and perception (72.90), high transportation cost (69.93), scarcity of labor (61.22) and huge competition (59.99). These are the main causes that hinders shrimp farming in the study area. The government has ample scope to establish processing industries, cold storage facilities in sufficient capacity to meet out present requirement. Proper Dissemination of market information like daily market price of the shrimp product through cell phones is need of the hour. Adoption of these measures can easily protect the farmers from the price shock in the market. The same results were aligned with the study conducted by Kumar *et al.* (2019).

Conclusion

The present study concludes that shrimps farming, although stated with high expectations, is facing severe setbacks due to several constraints and fetching heavier economic losses. Constraints such as non-availability or lack of experience (socio personal constraints), lack of technical guidance (technical constraints), high initial investment (economic Constraints), diseases outbreak (environmental constraints), lack of quality standards (management constraints), high fluctuation in price (marketing constraints) were the major constraints. And due to this constraints the economic losses was 10 per cent of the to total returns (Maity, 2019) So, we have to be addressed this with appropriate existing measures which include the adoption of Better Management Practices (BMP) and HACCP principles at shrimp farming facilities to produce zero-defect shrimp products. Among the constraints faced by market functionaries, the perishability of the product was a major constraint. The need of the hour is to address all the identified/analyzed constraints with a more holistic approach and immediate preventive measures to be taken to sustain shrimp farming in all shrimp farming states and Karnataka in particular.

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