Original Research Article

An ~~analysis~~ Analysis of Shrimp Culture Business in Nellore D~~d~~istrict, Andhra Pradesh

Abstract

The study was taken up to analyse the Shrimp Culture Business in Nellore district, Andhra Pradesh. The performance of shrimp culture business in terms of production, marketing, finance and also constraints faced by aqua farmers were analysed. Aquaculture farmers were classified into small (1-2 ha), semi-medium (2-4 ha), medium (4-10 ha) and large farmers (>10 ha). The results revealed that the average gross income earned was Rs.31.91lakh/ha/crop,Rs.31.73 lakh/ha/crop,Rs.31.79 lakh/ha/crop, Rs.32.57 lakh/ha/crop by small, semi-medium, medium and large farmers respectively. The net income per hectare per crop for large farmers (Rs.13.07 lakh)was highest followed by medium (Rs.11.8 lakh), semi medium (Rs.11.1 lakh) and small (Rs.10.42 lakh) shrimp culture farmers.Break-even price revealed that small, semi-medium, medium and large farmers can choose to price one kg of shrimp above Rs.256, Rs.247, Rs.239, and Rs.228 respectively. The profitability ratio showed that Gross profit margin and net profit margin for large farmers was high when compared to small, semi-medium, medium and large farmers.Non availability of quality seeds and high price of feed were the major problems faced by the farmers in production. Fluctuations in shrimp price and insufficient market information were major constraints faced by the farmers in marketing.

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KEYWORDS:*shrimp culture, Aquaculture, gross income, net income,break-even price, Quality seeds.*

1. Introduction

Aquaculture has emerged as one of the fastest growing food farming systems at global level with enormous potential for further development (Sathiadhas*et al.*,2009). The significant expansion of the fisheries and aquaculture production came with many transformations. Globally in the last three decades, aquaculture has been the main driver of increase in fisheries and aquaculture production, with an average growth of 5.2 percent per year in the period 2000–2019, reaching a record 85.3 million tonnes in 2019. Total aquaculture

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production of aquatic animals reached its peak at 88 million tonnes in 2020, despite the related impacts of COVID-19(FAO Statistics, 2021).

India is the second largest producer and exporter of shrimp. The total shrimp production in India was 8.5 lakh MT in the year 2020-21. The share of *Litopenaeusvannamei*was high when compared to tiger shrimp and scampi with 3.24 per cent and 0.97 per cent respectively. In India, Andhra Pradesh accounted for major share of shrimp (*Litopenaeusvannamei*) production with 77.80 per cent, followed by Gujarat and Tamil Nadu with 6.18 per cent and 5.48 per cent respectively (MPEDA, 2020).Shrimp farming for commercial purpose began in the years 2009–2010. Brackish water aquaculture in Andhra Pradesh is almost synonymous with shrimp culture (Srinivas and venkatrayulu, 2016).

2. Review of literature

Durai and Alagappan (2020) carried out thetechno-economic analysis of the shrimp farming practices in the coastal districts of Tamil Nadu. According to the findings, the key expenditure in shrimp farming activities was feed (42.94 per cent) followed by power (10.10 per cent), medicines (8.97 per cent), and seed (8.26 per cent). With a BCR of 1.85, shrimp growers generated a net profit of Rs.11.47 lakh/ha.

Narkis*et al.*, (2021) conducted economic studies of shrimp production and the restrictions encountered by shrimp producers inNagapattinam district ofTamil Nadu. According to the study, shrimp producers earned an average gross return of Rs.24.4 lakhper hectare and a net return of Rs.8.7 lakhper hectare. Farmers' biggest restraint in shrimp production was disease problems and high feed costs.

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Venkateswarlu and Chenji (2019) reported that culture ponds of 40 per cent in West Godavari, 50 per cent in East Godavari, 65 per cent in Guntur, 70 per cent in Nellore, 69 per cent in Krishna were disease affected. More disease-related difficulties were noted throughout the summer crop in all sites. Farms that applied biosecurity measures and those that were free of Dissolved Oxygen (DO) issues had fewer illnesses.

Lekshmi*et al.*,(2011) concluded that disease incidence, low seed quality, and lack of quality control agencies were the constraints faced by farmers in shrimp cultivation.

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3.Materials and methods

This study was carried out during May 2022 to June 2022 and was confined to Nellore District, Andhra Pradesh.Nellore district consists of 46 mandals. Three mandals

namely Kota, Chillakur, and Chittamur were selected purposively to analyse the performance of shrimp culture business in terms of production, marketing, finance and constraints encountered by the shrimp culture farmers. From each mandal two villages were selected and from each village 10 shrimp culture farmers were selected by simple random sampling procedure. Thus the total sample size was 60 shrimp culture farmers. Primary data was collected by personal interview with the help of well-structured interview schedule from 60 shrimp culture farmers, 10 market commission agents, seven retailers and three processing units. Cost of cultivation was estimated to analyse costs and returns. To analyse the marketing efficiency Shepherd's method of estimation was analysed. Financial ratios were estimated to analyse the performance of shrimp culture farms. Garrett ranking technique was used to identify the constraints encountered by the shrimp culture farmers.

4. Results and discussion

4.1 Socio-economic profile of the shrimp culture farmers

A brief socio-economic profile of the sample shrimp culture farmers of Nellore District is presented in the Table 1.

Table 1: Socio-economic profile of the shrimp culture farmers

S. No	Category	Frequency (N = 60)	Percentage
I	**Age(in Years)**		
1	Young Adults (18-35)	18	30.00
2	Middle age Adults(36-55)	40	66.67
3	Older Adults(>55)	2	3.33
II	**Family type**		
1	Nuclear	52	86.67
2	Joint	8	13.33
III	**Education Status**		
1	Illiterate	10	16.67
2	Primary	2	3.33
3	Secondary	13	21.67
4	Higher Secondary	18	30.00
5	Graduate	14	23.33
6	Post Graduate	3	5.00
IV	**Occupational Status**		
1	Shrimp culture alone	17	28.33
2	Shrimp culture + Agriculture	25	41.67

3	Shrimp culture + Business	18	30.00
V	**Farming Experience**		
1	< 5 years	15	25.00
2	6-10 years	27	45.00
3	Above 10 years	18	30.00

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Comments or interpretations should come first before the table or figure

Most of the farmers were middle aged. In the study reported byNarkis*et al* (2021) middle age group people were predominantly engaged in shrimp farming in Nagapattinam district of Tamil Nadu. Majority of the farmers had nuclear type family with higher secondary and graduate level education. Among the farmers 28.33 per cent of farmers had shrimp culture alone as occupation. In terms of experience 45 per cent of the shrimp culture farmers had 6-10 years followed by more than 10 years (30 per cent).

4.2 Shrimp farm details

Shrimp farm details of sample farmers are presented in Table 2.

Table 2:shrimp farm details

S. No	Category	Frequency (N = 60)	Percentage
I	**Farm size**		
1	Small Farmers (1-2 ha)	23	38.33
2	Semi-Medium Farmers (2-4 ha)	19	31.67
3	Medium farmers (4 -10 ha)	12	20.00
4	Large farmers (> 10)	6	10.00
II	**Ownership details**		
1	Owned	36	60.00
2	Owned +Leased	24	40.00

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Based on farm size, majority of farmer's were small farmers (38.33 per cent) followed by semi- medium (31.67 per cent), medium (20 per cent), and large farmers (10 per cent). Among the farmers 60 per cent of the farmers had own ponds and 40 per cent of the farmers had own and leased ponds.

4.3 Cost and Returns of shrimp culture(Rs/ha/crop)

The cost and returns of shrimp culture per hectare per crop of small, semi- medium, medium and large farmers were analysed and the results were given in Table 3.

Table 3: Cost and return of shrimp culture (per hectare/crop)

S. No	Particulars	Amount (in Rs)			
I	**Fixed Cost**	**Small Farmers**	**Semi-medium Farmers**	**Medium Farmers**	**Large Farmers**
1	Depreciation	88821.30 (4.14)	68304.92 (3.31)	81940.93 (4.10)	86942.20 (4.46)
2	Salaries to permanent labour	27544.91 (1.28)	18855.22 (0.91)	13404.83 (0.67)	9375.00 (0.48)
3	Interest on Capital Investment	93420.79 (4.35)	89659.20 (4.35)	86892.20 (4.35)	64064.05 (3.29)
4	Lease Value /rental value for own land	119386.23 (5.56)	106481.48 (5.16)	91052.28 (4.56)	94531.25 (4.85)
5	Rent (generator)	49700.60 (2.31)	30639.73 (1.48)	20643.43 (1.03)	6250.00 (0.32)
6	**Total fixed cost**	378873.83 (17.64)	313940.55 (15.21)	293933.67 (14.71)	261162.50 (13.40)
II	**Variable cost**				
1	Pond preparation	25556.60 (1.19)	22659.80 (1.10)	22136.60 (1.11)	20856.40 (1.07)
2	Cost of seed	152514.97 (7.10)	154545.45 (7.49)	150804.29 (7.55)	150000.00 (7.69)
3	Cost of feed	776766.47 (36.16)	789898.99 (38.28)	770777.48 (38.58)	766666.67 (39.33)
4	Fertilizers & Manures	20750.52 (0.97)	20559.30 (1.00)	20226.22 (1.01)	20000.50 (1.03)
5	Medicines/probiotics	426727.54 (19.87)	410236.53 (19.88)	400607.91 (20.05)	398916.67 (20.46)
6	Lab test (water quality)	3089.82 (0.14)	3151.52 (0.15)	2895.44 (0.14)	2875.00 (0.15)
7	Electricity	112500.65 (5.24)	112387.50 (5.45)	112254.90 (5.62)	112456.65 (5.77)
8	Fuel cost	1550.00 (0.07)	1542.50 (0.07)	1523.40 (0.08)	1500.00 (0.08)
9	Labour charges (pond construction)	6631.74 (0.31)	6338.38 (0.31)	6253.35 (0.31)	6250.00 (0.32)
10	Labour charges (intercultural)	27544.91 (1.28)	18855.22 (0.91)	13404.83 (0.67)	9375.00 (0.48)
11	Labour charges (Harvesting)	8233.53 (0.38)	7138.05 (0.35)	6655.50 (0.33)	6445.31 (0.33)
12	Labour charges (postharvest)	2544.91 (0.12)	2533.67 (0.12)	2500.00 (0.13)	2500.00 (0.13)
13	Miscellaneous expenses	15025.50 (0.70)	12254.90 (0.59)	11546.50 (0.58)	9653.90 (0.50)
14	Interest on working capital	189532.46 (8.82)	187452.22 (9.08)	182590.37 (9.14)	180899.53 (9.28)
	Total variable cost	1768969.62 (82.36)	1749554.03 (84.79)	1704176.78 (85.29)	1688395.63 (86.60)
	Total Cost Per crop/Season	2147843.45 (100)	2063494.58 (100)	1998110.45 (100)	1949558.13 (100)

	Returns				
1	Yield of shrimp/crop (in kg)	8396.54	8361.39	8367.59	8572.05
2	Average Price (Rs/kg)	380.00	380.00	380.00	380.00
3	Gross Income	3190685.30	3177328.84	3179684.24	3257378.47
4	Net income	1042841.84	1113834.26	1181573.79	1307820.34
5	BCR	1.49	1.55	1.59	1.67
6	Production cost (Rs/kg)	255.80	245.67	238.79	227.43

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(Values in parenthesis indicates per cent contribution to total cost)

The total cost of shrimp culture was highest for small farmers (Rs.21.47 lakh/ ha) followed by semi-medium (Rs.20.63 lakh/ ha), medium (Rs.19.98 lakh/ ha) and large farmers (Rs.19.49 lakh/ ha). For all the categories of farmers, the major factors of total cost was cost of feed followed by medicines/ probiotics and interest on working capital. The results revealed that the average gross income earned by large farmers (Rs.32.57 lakh/ha/crop) was highest followed by small (Rs.31.91 lakh/ha/crop), semi-medium (Rs.31.73 lakh/ha/crop) and medium (Rs.31.79 lakh/ha/crop). These values are higher than the values reported by Narkis et al (2021) because yield of shrimp in Nellore district is more than Nagapattinam district. The net income per hectare per crop for large farmers (Rs.13.07 lakh) was highest followed by medium (Rs.11.8 lakh), semi medium (Rs.11.1 lakh) and small (Rs.10.42 lakh) shrimp culture farmers. Shrimp culture in Nellore district of Andhra Pradesh was found to be economically profitable as the Benefit Cost Ratio (BCR) was 1.49, 1.55, 1.59, and 1.67 for small, semi-medium, medium and large farmers respectively.

4.4. Marketing of Shrimp

4.4.1 Marketing Channels

The following channels were identified in the study area

Channel I

Farmer — Commission Agent — Processor cum Exporter —Consumer

Channel II

Farmer — Commission Agent — Retailer — Consumer

Majority of farmers areengaged in channel I because farmer get better price in channel I than channel II. The processing unit's exports majority of shrimp to countries like United States, United Kingdom, Netherlands, Vietnam, Canadaand South Africa.

4.4.2 Price Spread, Farmer'sshare in consumer rupee and Marketing efficiency

The Price Spread and Farmer's share in consumer rupee for small, semi- medium, medium and large farmers were calculated and the results are presented in Table 4.And marketing efficiency analysis using Shepherd's method was calculated and the results are furnished in Table 5.

Table 4: Price Spread and Farmer's share in consumer rupee (Rs/kg)

S. No	Marketing Channel	Average Price received by farmer(Small,semi-medium,medium,large)	Price paid by the consumer	Price Spread	Farmers share (%)
1	Channel I	380	750	370	50.6
2	Channel II	360	480	120	75.0

Comment [M8]: As above

Channel II was found to be more cost effective since it has the lowest price spread**.** Price paid by consumer was less in channelII as the shrimp was consumed without any further processing.Among the two channels, farmer's share in consumer rupee was relatively high in channel II.

Table 5: Marketing Efficiency Analysis using Shepherd's method

S. No	Particulars	Channel I	Channel II
1	Consumer price(V)	750	480
2	Total Marketing Cost(I)	83.56	29.8
3	Marketing Efficiency (ME)= (V/I)-1	7.98	15.11

Comment [M9]: The same here

ChannelII was found to be more efficient in marketing efficiency since processing charges are not there in channel II and transportation cost is less when compared to channel I.

4.5 Financial Analysis of Shrimp Culture

4.5.1 Break even analysis of shrimp culture

The break even analysis of shrimp culture was analysed and furnished in Table 6

Table 6: Break even analysis of shrimp culture

S.No	Particulars	Small Farmers	Semi-medium Farmers	Medium Farmers	Large Farmers
1	Break-even production (kg)	2238	1839	1667	1427
2	Break-even point of sales (Rs)	850440	6987820	633460	542260
3	Break-even price (Rs/kg)	256	247	239	228

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Break-even price revealed that small, semi-medium, medium and large farmers can choose to price one kg of shrimp above Rs.256, Rs.247, Rs.239, and Rs.228 respectively. Break-even production results indicated that small, semi-medium, medium and large farmers has to sell 2238 kg, 1839 kg, 1667 kg, 1427 kg of shrimp in one crop period (four months) to reach breakeven production.

4.5.2 Profitability ratio

The profitability ratios were calculated and furnished in Table 7**.**

Table 7: Profitability ratio of shrimp culture

S. No	Particulars	Small Farmers (in per cent)	Semi-medium Farmers (in per cent)	Medium Farmers (in per cent)	Large Farmers (in per cent)
1	Gross Profit Margin	48	49	50	52
2	Net Profit Margin	33	36	38	41

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The Gross profit margin and net profit margin for large farmers was more when compared to small, semi-medium, and medium farmers. The results indicated that large farmers managed well in production cost and labour cost to earn profit.

4.6Constraints faced by Shrimp farmers

Using Garrett ranking method the constraints encountered by the shrimp culture farmers in shrimp production and marketing were ranked and the results are presented in Table 8 and Table 9.

Table 8: Constraints in Production of shrimp

(n=60)

S. No	Particulars	Garrett score	Ranking
1	Non Availability of quality seed	83	I
2	High price of Feed	72	II
3	High Turbidity	65	III

4	Plankton Problems	59	IV
5	Low dissolved Oxygen	55	V
6	Acidity	50	VI
7	Sedimentation	45	VII
8	Seepage	41	VIII
9	Low productive soil	35	IX
10	Poaching	28	X
11	Lack of laboratories	17	XI

Comment [M12]: Same here

From Table 8 it could be inferred that non availability of quality seed and high price of the feed were major constraints faced by the farmers in production and the similar result was reported by Jagadeesh (2015). In the study area,majority of farmers purchased seed from hatcheries of Pondicherry and local hatcheries of Nellore district. Lack of knowledge in seed selection is the major reason for the first constraint faced by farmers.

Table 9: Constraints in Marketing of shrimp

(n=60)

S. No	Particulars	Garrett score	Ranking
1	Fluctuations in shrimp price	75	I
2	Insufficient market information	60	II
3	Fluctuations in Demand and Supply	50	III
4	Lack of Common Cold storage	40	IV
5	Distance of market	24	V

From Table 9 it was inferred that fluctuations in shrimp price was the first and most important constraint for shrimp farmers and Sahu*et al* (2014) also reported price fluctuation as the most important constraint. During the study it was revealed that price of the shrimp was fixed based on demand of exporters. Insufficient market information is the second major constraint faced by the farmers in marketing of shrimp.

5. Conclusion and Recommendation

Economies of scale are operating in shrimp culture farms in Nellore District, Andhra Pradesh. The net income per hectare per crop for large farmers (Rs.13.07 lakh) was highest followed by medium (Rs.11.8 lakh), semi medium (Rs.11.1 lakh) and small (Rs.10.42 lakh) shrimp culture farmers. Channel II (Domestic channel) was found to be more cost effective since it has the lowest price spread (Rs.120/kg)**.** Among the twochannels, farmer's share in consumer rupee was relatively high in channel II (Domestic channel).The profitability ratio showed that Gross profit margin and net profit margin for large farmers was high when compared to small, semi-medium, and medium farmers. Non availability of quality seeds and high price of feed were the major problems faced by the farmers in production. Fluctuations

in shrimp price and insufficient market information were major constraints faced by the farmers in marketing.

Government should promote production of quality seeds and it should also provide training on seed selection to farmers so that farmer can choose high quality seed and could solve the problem of disease outbreaks and ensure high survival rate. Dissemination of price information through mass media such as newspapers, television and through mobile local applications would assist farmers in securing good price for shrimp. Research should undertake in reducing feed cost without compromising the productivity of shrimp. New technology should be disseminated to increase the production of shrimp.

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Comment [M13]: Reference should not be numbered but arranged in alphabetical order