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Assessment of production, marketing and management constraints in *P. vannamei* shrimp farming of Andhra Pradesh

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Abstract

Shrimp farming is a major aquaculture business in Andhra Pradesh, providing significant income to farmers, generating employment opportunities, and seafood exports. However, the sector faces various manufacturing, marketing, and managerial issues that have an impact on its long-term viability and profitability. A sample of 200 shrimp farmers were selected to identify and examine the primary constraints faced by shrimp producers by using simple random sampling technique in Bapatla district of Andhra Pradesh state. Ex post facto research design was adopted to collect data with well-structured and pretested interview schedule. A set of thirty-two constraints were identified and categorized into seed, feed, disease, marketing, management, and miscellaneous constraints. High feed costs (97%), White Spot Syndrome Virus (WSSV) incidence (98%), lack of ice and plastic factories (100%), input price fluctuations (96%), lack of storage facilities (95%), high seed costs (93%), poor seed quality and mortality (90%), and insufficient awareness of government support services were identified as the most critical constraints affecting shrimp farming. The findings emphasize the importance of improving seed and feed quality, strengthening disease detection, extension services, expanding marketing and cold-chain infrastructure, and raising knowledge of institutional support mechanisms. Addressing these barriers through focused policy interventions and capacity-building initiatives can help to the sustainability and profitability of shrimp farming in Andhra Pradesh.

Keywords: Shrimp farming, constraints analysis, *Penaeus vannamei*, aquaculture, Andhra Pradesh, Bapatla district, sustainable aquaculture

Introduction

Aquaculture has emerged as one of the world's fastest expanding food production sectors, making important contributions to food security, employment generation, export revenues, and rural livelihoods. Shrimp farming is a key aquaculture commodity due to its high economic value and significant international market demand. India is one of the world's biggest producers and exporters of farmed shrimp, with frozen shrimp accounting for the majority of the country's seafood export revenues. In 2025-26, India recorded its highest-ever seafood exports, hitting 1.97 million metric tonnes valued at ₹73,890 crore. Frozen shrimp was the main export commodity driving this development. Andhra Pradesh is India's largest shrimp producer and the backbone of the country's shrimp export economy. The state accounts for more than half of India's farmed shrimp production and has the greatest area under *Penaeus vannamei* cultivation. According to MPEDA 2026 reports, Andhra Pradesh accounted for 71,921 ha under *P. vannamei* cultivation, generating 6,34,672 metric tons with a productivity of 8.82 MT ha⁻¹ year⁻¹, significantly higher than the national average.

According to current statistics, Andhra Pradesh accounts major share of India's total seafood exports and is the country's largest aquaculture hub, notably in coastal districts like Bapatla, Krishna, East Godavari, West Godavari, and

Nellore (MPEDA, 2024-25). Despite its remarkable growth and economic significance, shrimp farming in the state confronts a range of production and marketing obstacles, including concerns about seed quality, feed costs, disease outbreaks, infrastructure shortages, market fluctuations, and management strategies. These constraints have the potential to reduce shrimp farming operations' productivity, profitability, and sustainability. As a result, understanding and prioritizing the restrictions faced by shrimp producers is critical for creating effective policy interventions and extension programs. In this regard, the current study was conducted to assess the key obstacles faced by shrimp farmers.

Materials and methods

A sample of 200 shrimp farmers were selected through simple random sampling technique to identify the constraints faced by farmers in shrimp farming in Bapatla district, Andhra Pradesh state. Ex-post facto research design was adopted to collect information about constraints faced by shrimp farmers. A semi-structured interview schedule was developed and farmer group discussions were also held to collect primary data. After review of the literature and a discussion with an expert group, the constraints that shrimp producers encounter were identified. A total of 32 constraints were enlisted and categorised under five heads

i.e. seed constraints (05 nos.), feed constraints (04 nos.), disease constraints (03 nos.), marketing constraints (07 nos.), management constraints (06 nos.) and miscellaneous constraints (07 nos.). Percentage analysis is performed based on the farmers' statements, and Garrett ranking method followed to highlight and rank the most critical constraints experienced by shrimp farmers.

Results and Discussion

Seed constraints

The respondents' major seed constraints were tabulated in table 1. Ninety-three percent (93%) of respondents cited that high cost of seed as major constraint (Mittal, I. and Mavi, H.K., 2025) (Patil, S. and Sharma, A., 2020) (Mohamed et al 2013), (Koteswari et al, 2014), (Jagadeesh, 2015) (Srinivas and Venkatrayalu 2016). And majority of farmers identified three major issues in shrimp farming: heavy mortality of hatchery seeds due to low quality 90% (Tank, K.V. et.al 2019) (Tandel, J. and Maheta, D., 2018.), insufficient supply of hatchery seeds at the necessary period (88%) (Tejavath Jagadeesh, 2015) and non-availability of quality seed 90% (Chittem, P.B. and Kunda, S.K., 2017) (Patil, S. and Sharma, A., 2020). Furthermore, mixed seed or variations in seed size from hatcheries caused issues for 65% of the respondents (Ravichandran, P., 2025), (Phana, N.T et.al 2022) [26, 22, 17, 21, 34, 6, 13, 14, 18, 20, 32, 35].

Feed constraints

The main feed limitations that the respondents faced were listed in table 2. The most significant issue, according to 97% of farmers, is the high cost of feed (Mittal, I. and Mavi, H.K., 2025) (Patil, S. and Sharma, A., 2020) (Tank, K.V. et.al 2019) (Sayed et al, 2013) (Tandel and Meheta, 2018). 77% of respondents agreed that the feed was of poor quality (Chittem, P.B. and Kunda, S.K., 2017), (Tandel and Meheta, 2018) and 71% reported that aflatoxins in the feed caused problems. Additionally, 58% of respondents cited that absence of feed mills or processing facilities as one of the limitations (Chittem and Kunda 2017), (Mohamed et al 2013), (Koteswari et al 2014) (Jagadeesh, 2015) [6, 13, 14, 17, 18, 20, 21, 33, 34].

Disease constraints

The respondents stated major shrimp health problems in the table 3. According to 98% of respondents, WSSV was the most dangerous disease (Santhosha, K.M. and Naik, A.D., 2022), (Hira, B et.al 2025) followed by EHP 88% (Bhargavi, K.S.S et.al., 2025) (Sai Susmitha Bhargavi K., et.al 2024) (Geetha R et.al, 2022) (Patil PK et.al, 2021) and Vibriosis 85% (Chellapandian, H et.al. 2021). Some of the respondents reported that these diseases were not a problem in aquaculture [5, 9, 12, 20, 21, 29, 30].

Marketing constraints

The respondents' main marketing obstacles are displayed in the table 4. The majority of farmers cited inputs price variations (96%), (Tothova M., 2011) (Lin, D.Y. and Wu, M.H., 2016) (Tank, K.V., et.al 2019) (Patil, S. and Sharma, A., 2020) (Bhargavi, K.S.S et.al, 2025), lack of storage facilities 95%, (O'Keefe, T. and Campabadal, C.A., 2022) (Silva, J.L. et.al 2010) and the absence of ice and plastic factories 100% (Hassan, M.N et.al 2012) (Yamagata, M.

and Low, L.K., 1995) as their top concerns. Ninety-one percent of the respondents stated that they had no government support, (Patil, S. and Sharma, A., 2020) and eighty-eight percent reported they had problems because they were far from the market (Ha, T.T.P et.al 2013) (Phillips, M. and Subasinghe, R., 2010) and lack awareness about product cost or how to store it. Just 11% of respondents stated that excessive commission fees were a significant barrier [23].

Management constraints

The table 5 shows the primary managerial constraints of the responders. The majority of farmers listed ignorance of export-oriented standards (80%) and insufficient inlet and exit canals for feeding and drainage (70%) as their top concerns. Sixty-two percent of respondents stated they were uninformed of MPEDA/CAA services (Saha, A.M.B. and Roy, A., 2019). (Tandel, J. and Maheta, D., 2018.), whereas forty percent reported unaware of quarantine requirements (Santhosha, K.M. and Naik, A.D., 2022). In contrast, fewer respondents admitted to issues with theft (15%) and birds (20%). Roshnath, R et.al (2014) and Ramesh Roshnath et.al (2014) reported engaging dogs as guards and bird fencing would reduce the theft issues and damage from migratory birds. These data demonstrates that inadequate infrastructure and a lack of institutional and technical expertise are the primary management challenges affecting farmers. Cold storage facilities are necessary to maintain post-harvest shrimp quality over extended periods of time. It also decreases post-harvest losses during marketing. Government institutions, such as NABARD and MPEDA, can support shrimp marketing development through various schemes (Santhosha, K.M. and Naik, A.D., 2022). Each block should have one or more ice factories. Shrimp growers and middlemen cited transportation as a major impediment in marketing shrimp. Increased fuel and transportation costs impact the marketing of shrimp [25, 27, 28, 30, 33].

Miscellaneous constraints

The table 6 illustrates that the respondents' diverse miscellaneous constraints. Most farmers identified lack of post-harvest knowledge (79%) (Tolentino, P.D.H. et.al 2026). Bisheko, M.J. and Rejikumar, G., 2023 stated that high cost, local unavailability and suitable low price preserving and packaging facilities were major constraints of south Asian farmers. Lack of knowledge of tidal changes (68%), also major concerns (Kumaran, Met. al 2017). Forty percent of respondents indicated they did not possess insurance or access to experienced engineers. According to Bhargavi, K.S.S., et al. (2025) and Pongthanapanich T. et al. (2019), shrimp crop insurance aids in managing biotic and abiotic risks as well as price volatility in shrimp farming. Tu, V.H et.al, 2025 findings indicate that personalized insurance plans are more beneficial than one-size-fits-all approaches. Insurers and politicians should create adaptable policies based on farmers' risk perceptions and financial capabilities. In comparison, fewer respondents observed issues associated with shortage of hired labour (17%) (Tank, K.V. et.al 2019) (Chittem, P.B. and Kunda, S.K., 2017), and lack of facilities for assessing soil quality (15%) (Chowdhury, M.A et.al 2015) [2, 4, 6, 8, 11, 15, 19, 20, 21, 24, 31, 34, 36, 37, 39].

Conclusion

The present study identified and studied the primary constraints encountered by shrimp producers in Bapatla district of Andhra Pradesh state. The data revealed that high input costs, notably feed and seed prices, were the most important productivity restrictions. Farmers also reported significant challenges due to poor seed quality, disease outbreaks such as White Spot Syndrome Virus (WSSV) and *Enterocytozoon hepatopenaei* (EHP), price fluctuations in inputs, lack of storage and post-harvest infrastructure, and insufficient awareness of institutional support services. Furthermore, challenges in technical knowledge, marketing facilities, and post-harvest management were found to adversely affect the profitability and sustainability of shrimp farming. Addressing these limitations a collaborative effort from government agencies, research institutes, hatcheries, feed makers, and extension programs is needed. Ensuring the availability of quality seed, strengthening disease surveillance systems, improving marketing and cold-chain infrastructure, increasing insurance coverage, and improving

farmers' access to technical training and institutional services can all have a significant impact on farm productivity and income. The study's findings can help policymakers and stakeholders design focused interventions for sustainable shrimp aquaculture development in Andhra Pradesh.

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Author contribution

P. Mukkanti - Data Collection Analysis & Preparation of Manuscript, Sumanth Kumar Kunda- Research methodology sampling plan discussion of result and manuscript revision.

Table 1: Seed constraints faced by shrimp farmers

S. No	Seed Constraints	Frequency (Yes) (n=200)	Yes (%)	Rank	Frequency (No) (n=200)	No (%)
1	High cost of the seed	186	93	I	14	7
2	Non availability of quality seed	180	90	II	20	10
3	Heavy mortality of hatchery seeds due to poor quality	180	90	II	20	10
4	Inadequate supply of hatchery seeds in the required time	176	88	III	24	12
5	Mixed seed or differential size of the seed from hatcheries	130	65	IV	70	45

Table 2: Feed constraints faced by shrimp farmers

S. No	Feed Constraints	Frequency (Yes) (n=200)	Yes (%)	Rank	Frequency (No) (n=200)	No (%)
1	High cost of feed	194	97	I	6	3
2	Low quality of feed	154	77	II	46	23
3	Aflatoxins in feed	142	71	III	58	29
4	Lack of feed processing units (Feed mills)	116	58	IV	84	42

Table 3: Disease constraints faced by shrimp farmers

S. No	Disease Constraints	Frequency (Yes) (n=200)	Yes (%)	Rank	Frequency (No) (n=200)	No (%)
1	WSSV	196	98	I	4	2
2	EHP	176	88	II	24	12
3	Vibriosis	170	85	III	30	15

Table 4: Marketing constraints faced by shrimp farmers

S. No	Marketing Constraints	Frequency (n=200)	Yes (%)	Rank	Frequency (No) (n=200)	No (%)
1	Lack of ice factories and plastic factories	200	100	I	0	0
2	Price fluctuations of inputs	192	96	II	8	4
3	Lack of storage facilities	190	95	III	10	5
4	Lack of government support	182	91	IV	18	9
5	Distance from the market	176	88	V	24	12
6	Lack of information on price and storage of produce	176	88	VI	24	12
7	High commission charges	22	11	VII	178	89

Table 5: Management constraints of shrimp farmers

S. No	Management Constraints	Frequency (n=200)	Yes (%)	Rank	Frequency (No) (n=200)	No (%)
1	Information on export-oriented standards	160	80	I	40	20
2	Absence of proper inlet (Feeding) and outlet (Drainage) canals	160	70	II	60	30
3	Knowledge about services of MPEDA/CAA	124	62	III	76	38
4	Awareness about Quarantine standards	80	40	IV	120	60
5	Problem of birds	40	20	V	160	80
6	Problem of theft	30	15	VI	170	85

Table 6: Miscellaneous constraints of shrimp farmers

S. No	Miscellaneous Constraints	Frequency (n=200)	Yes (%)	Rank	Frequency (No) (n=200)	No (%)
1	Lack of Post harvest knowledge	158	79	I	42	21
2	Lack of knowledge on tidal fluctuations	136	68	II	64	32
3	Lack of availability of experienced engineers	80	40	III	120	60
4	Lack of insurance policy	80	40	IV	120	60
5	Scarcity of the hired labour	34	17	V	166	83
6	Lack of facilities to test the soil quality	30	15	VI	170	85
7	Floods	8	4	VII	192	96

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