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Economic analysis of fish seed production: A case study of Matsyabeej Kendra Bhigwan, Maharashtra

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Abstract

Fish seed production is a foundational activity for the growth of inland aquaculture, as it ensures the availability of quality seed required for sustainable fish farming. The present study examines the management practices, cost structure, profitability, and financial feasibility of a fish seed production unit located at Bhigwan in Pune district of Maharashtra. Primary data were collected through personal interviews with the owner and workers of the selected unit, while secondary information was obtained from official reports and published literature. Economic analysis was carried out using cost-return analysis, break-even analysis, and discounted cash flow techniques such as Net Present Worth (NPW), Benefit-Cost Ratio (BCR), Internal Rate of Return (IRR), and Payback Period. The results revealed that the enterprise incurred an annual total cost of Rs.8.24 lakh and generated gross returns of Rs.15.00 lakh, resulting in substantial net benefits. The financial indicators showed a BCR of 1.69, IRR of 55 per cent, and a payback period of about 2.5 years, indicating strong economic viability. The study concludes that fish seed production is a profitable and feasible allied enterprise with significant scope for expansion and rural employment generation.

Keywords: Fish seed production, hatchery management, cost and returns, financial feasibility, IRR

1. Introduction

Fisheries and aquaculture have emerged as one of the fastest-growing sectors within agriculture, contributing significantly to food and nutritional security, employment generation, and income enhancement. Fish is widely recognized as an affordable source of high-quality animal protein and essential micronutrients, particularly for rural and economically weaker sections of society. In India, the rapid expansion of inland aquaculture has substantially increased the demand for quality fish seed, making seed production a critical component of sustainable fish farming.

The success of aquaculture enterprises largely depends on the timely availability of healthy, genetically superior, and disease-free fish seed. Hatchery-based seed production, supported by induced breeding technologies, has enabled India to achieve remarkable growth in fish production. However, despite technological progress, fish seed production units continue to face challenges related to broodstock management, seasonal dependency, operational costs, and pricing mechanisms.

Maharashtra possesses considerable freshwater resources suitable for aquaculture, yet organized fish seed production remains limited in many regions. Bhigwan, located near the Ujani reservoir, has emerged as an important fisheries hub due to favorable agro-climatic conditions and strong market demand. In this context, the present study was undertaken to analyze the management and economic performance of a selected fish seed production unit, Matsyabeej Kendra Bhigwan, with the objective of assessing its financial feasibility and identifying areas for improvement.

2. Objectives

1. To study capital investment of Matsyabeej Kendra Bhigwan, Maharashtra.
2. To evaluate economic analysis of fish seed production in Matsyabeej Kendra Bhigwan, Maharashtra.

3. Methodology

3.1 Selection of Study Area

The study was conducted at Matsyabeej Kendra Bhigwan, situated in Indapur taluka of Pune district, Maharashtra. The unit was purposively selected due to its established hatchery infrastructure, commercial scale of operation, and accessibility for detailed data collection.

3.2 Data Collection

Primary data were collected through direct personal interviews with the owner and workers of the unit using a pre-tested structured schedule. Information related to capital investment, operating costs, production, and returns was collected for analysis. Secondary data were obtained from government publications, research articles, and official fisheries statistics.

3.3 Analytical Framework

The collected data were analyzed using standard economic tools: - Cost and return analysis - Break-even analysis - Net Present Worth (NPW) - Benefit-Cost Ratio (BCR) - Internal Rate of Return (IRR) - Payback Period.

Total Cost = Total Fixed Cost + Total Variable Cost

Net Present Worth = Present Worth of Benefit- Present Worth of Cost

Benefit Cost Ratio=Present Worth of Benefit / Present Worth of Cost

Pay Back Period= Initial Investment/Annual Net cash Flow

Internal rate of return calculated by discount an investment's future cash flows to makes the NPV of an investment equal zero.

4. Results and Discussion

4.1 General Profile of the Selected Unit

Matsyabeej Kendra Bhigwan was established in 2018 and is engaged in the production of carp fish seed. The unit operates with eight rearing ponds and two hatchery units. The enterprise produces spawn, fry, and fingerlings using

induced breeding techniques. The annual production capacity of the unit was approximately five crore spawns.

Table 1: General profile of Matsyabeej Kendra Bhigwan

Particulars	Details
Name of the Unit	Matsyabeej Kendra Bhigwan
Location	Bhigwan, Pune district
Year of establishment	2018
Number of ponds	8
Number of hatcheries	2
Major species	Catla, Rohu, Mrigal
Annual capacity	5 crore spawns

The table no.1 indicates that the unit had adequate infrastructure to support commercial-scale fish seed production.

4.2 Capital Investment Structure

The total initial investment of the unit amounted to Rs.17,49,900. Major components included hatchery construction, water source development, office and sales facilities, and essential machinery and equipment.

Table 2: Capital investment structure of the selected unit.

Component	Amount (Rs.)	Share (%)
Hatchery construction	6,00,000	34.29
Pond construction	6,00,000	34.29
Water source development	3,40,000	19.43
Machinery and equipment	2,09,900	11.99
Total	17,49,900	100.00

The table no.2 indicates that the hatchery and pond construction together accounted for the largest share of investment of Rs.12,00,000 (68.58%) and remaining on water source development (19.43%) and Machinery and equipment (11.99%) highlighting the capital-intensive nature of fish seed enterprises.

4.3 Per Year Per unit cost of production of fingerlings

Table 3: Cost and returns from fish seed production

Sr. No.	Particulars	Amount (Rs.)	%
I)	Fixed cost		
1.	Depreciation on Building, Machinery and Equipment's	1,00,866.88	12.24
2.	Interest on fixed capital @10%	1,74,990	21.23
3.	Total Fixed Cost	2,75,856.88	33.46
4.	Fixed cost per batch	183.90	--
5.	Fixed cost per fingerling	0.61	--
II)	Variable cost		
1.	Brooders cost 500kg, 150/kg	61,365	7.44
2.	Feed cost	2,45,460	29.78
3.	Induced hormones (250 ₹each)	12,273	1.49
4.	Syringe	40.91	0.005
5.	Electricity expenses	8,182	0.99
6.	Incidental charge	2,045.50	0.25
7.	Labour charge (4months, 5 men, 300₹/men)	1,47,276	17.87
8.	Potassium permagnate	81.82	0.01
9.	Plastic bags	4,091	0.50
10.	Mortality	10000.00	1.21
11.	Interest on operating cost @12%	57,697.83	7.00
12.	Total Variable cost	5,48,513.06	66.54
13.	Variable cost per batch	365.68	--
14.	Variable cost per fingerling	1.22	--
15.	Total cost (FC+VC)	8,24,369.94	100
16.	Total cost per batch	549.58	--
17.	Total cost per fingerling	1.83	--

From the Table No.3 it was observed that, the total cost of Fingerling production was 549.58 Rs / Batch, in which fixed

cost constituted 183.90 Rs /Batch (33.46%) and variable cost accounted was 365.68 Rs /Batch (66.54%).

Table 4: Per Year Income Received from Fingerling Production:

Sr. No.	Particular	Unit	Quantity	Rate/Unit (Rs.)	Gross Income (Rs.)
1	Sale of Fingerlings	Batch of 300 fingerlings	1500	1000	15,00,000

Table No.4 provides information about income received from fingerling production.

Table 5: Per Year Cost and returns from fish seed production

Particulars	Value (Rs.)
Total annual cost (Rs.)	8,24,369.94
Gross returns (Rs.)	15,00,000
Net returns (Rs.)	6,75,630.06
Cost per batch (Rs.)	549.58

Table no.5 indicates the enterprise generates substantial net returns of Rs. 6,75,630.06 per year which shows making fish seed production a profitable activity.

Table 6: Break-even analysis of fish seed production

Particulars	Value (Rs.)
Fixed cost (Rs.)	2,75,856.88
Price per batch (Rs.)	1,000
Variable cost per batch (Rs.)	365.68
Break-even output (batches)	434.89

Table no.6 indicates the unit operates well above the break-even level, indicating lower financial risk.

4.4 Financial Feasibility Analysis

Discounted cash flow analysis was carried out to assess the long-term viability of the enterprise.

Table 7: Financial feasibility analysis of fish seed production

Year	Total cost (Lakh Rs.)	Total return (Lakh Rs.)	Net benefit (Lakh Rs.)	DF @ 15%	PWC@ 15% DF	PWB@ 15% DF
2020-21	12	6.13	-5.87	0.8696	10.43	5.33
2021-22	4.5	9.1	4.6	0.7561	3.40	6.88
2022-23	5.76	13.2	7.44	0.6575	3.79	8.68
2023-24	6.8	13.4	6.6	0.5718	3.89	7.66
2024-25	8.24	15	6.76	0.4972	4.10	7.46
Total					25.61	36.01
Net Present Worth (PWB-PWC)					10.4 Lakh	
Benefit-Cost Ratio (PWB/PWC)					1.41	
Internal Rate of Return (Trial and error method)					55%	
Payback period (Initial Investment/Annual Net cash Flow)					2.5 Years	

Table no.7 indicates the NPW was Rs.10.40 Lakh indicates positive net profit. Benefit cost ratio 1.41 indicates fish farming was financially feasible. Also Internal rate return was 55% and Payback period was 2.5 years. The high IRR and favorable BCR, NPW confirm the strong economic performance of the unit.

5. Conclusion

The study demonstrates that fish seed production at Matsyabeej Kendra Bhigwan was financially viable and profitable enterprise. Positive net present worth (10.40 Lakh), high internal rate of return (55%), benefit-cost ratio (1.41) greater than one, and a short payback period (2.5 Years) confirm the economic sustainability of the unit. Strengthening broodstock management, improving pricing mechanisms, and promoting year-round production can further enhance profitability. Fish seed production thus offers significant potential as an allied agricultural enterprise for income generation and rural development.

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