Economic Analysis of Fish Drying in Junput Khuti of West Bengal

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ABSTRACT

Introduction

Dry fishes are value-added products of low-cost marine fishes with increased shelf-life of the perishable fishes for longer storage. Among the world, India is the second fish producing country and contribute 5.43% in global fish production. In relations to nutritional quality of fish, sometimes dry fish show higher quality standards than of fresh fish (Payra et al., 2016). In India, consumption of dried fishes is about 32% of the total marine landings and about 17% of the total catch used for the production of dry fishes (Shakila et al., 2003).

In drying, salt is used to remove the non-halophilic, spore-forming bacteria and osmophilic fungi (Sivaraman et al., 2015). Dry fish is an essential source of animal protein supplement, which is preferred as a keydish or used as a flavouring agent in...
combination with other food items. However, all dry fish are in great demand during the fishing ban period when the availability of fresh fish in the market is lower (Das et al., 2013).

Fish is an essential component of the daily diet, and the dried fish is a vital source of protein in India and especially in West Bengal. Being a state of rivers, bays and reservoirs with a high potential of aquatic resources, fisheries of West Bengal play an important role in the employment generation of rural coastal people. The state has 3 coastal districts. They are East Midnapore, South 24 Parganas, North 24 Parganas. Essential landing centres are Diamond Harbour, Kakdweep, Namkhana, Digha, Sankarpur etc. The state has many landing centres and fishing villages along the coast. About 61 % of the total landings are taken in the fresh condition, and the remaining part is utilised by various fishery industries. The coastal people of these districts are engaged in fish curing/drying activities. In West Bengal where fish landing, as well as drying activity, is undertaken is known as Khuti (Samanta et al., 2016). In Khutis fishes are dried under natural sunlight in bamboo poles in the coastal areas. The major Khuties located a coastal West Bengal includes Digha mohana, Sankarpur, Jaldha, Junput, Mandarmoni, Petuaghat etc. (Payra et al., 2016). These khuties have produced 10152 tons dry fish during 2015-16 (GoWB, 2016).

Materials and Methods

Sampling frame

To assess the economics of fish drying of Junput Khuti of Deshpran CD Block from Contai sub-division was purposively selected as representative from the district of Purba Medinipur. A list of 150 families connected with fish drying who are living in the surrounding area of the selected Khutis were prepared, and ten Khuti owners and dry fish processors were randomly selected for questionnaire and interview. Similarly, two auctioneers, two wholesalers and two retailers were also randomly selected for marketing analysis through interview and questionnaires.

Questionnaires and data collection

The questionnaire was developed in a logical sequence of that the target group could answer chronologically. For this study, a combination of the questionnaire, interview, Participatory Rural Appraisal (PRA) tool such as Focus Group Discussion (FGD) and cross-check interviews with key informants were used.

Data collection

Secondary data were collected from the available sources. Primary data were collected in 2017-18 using pre-tested structured questionnaires and interview in the local language and subsequently converted to English. Collected data were suitably categorized, tabulated for interpretations, generalizations and implications.

Analysis of data

The collected data were statistically analyzed using the statistical package SPSS 20.0 computer program (SPSS Inc. Chicago, Illinois, USA). Microsoft Excel was used for the representation of data and results. To estimate the various cost and income (Salim and Biradar, 2011) and to obtain profitability measures (Dhondyal, 1998) available standard procedures were followed.

Results and Discussion

Capital cost

In table 2, when considering correlations of the capital cost of farms in Junput Khuti, it is
seen that there is significant (1% level) high positive correlation between Construction of cemented tank and total capital cost.

**Model 1: Revealed with stepwise method of regression**

\[
\text{Total capital cost} = 0.124 + 0.999 \times \text{construction of cemented tank} + 0.999 \times \text{construction of Bamboo rack} + 0.999 \times \text{Land and farm equipment} + 0.999 \times \text{Miscellaneous}
\]

The equation clearly indicates that the most important variables (average value calculated for 1 bigha, in all the cases) are the cost of Construction of cemented tank, construction of bamboo rack, Land and farm equipment and Miscellaneous which showed positive impact upon capital cost.

By observing adjusted $R^2$ value, it can be concluded that both parameters explain 100% variability in total capital cost.

**Variable cost**

A variable cost is a corporate expense that changes in proportion with production output. Variable costs increase or decrease depending on a company's production volume; they rise as production increases and fall as production decreases.

Variable costs are costs that change in proportion to the good or service that a business produces. Variable cost includes raw fish price, salt price, transportation cost, temporary shed, electricity charges, labour charges and miscellaneous.

The analysis depicted the variable cost value (unit: 1 bigha) for the raw fish price, salt price, transportation cost, cost of temporary shed, electricity charges, labour charge and the miscellaneous cost was Rs. 1283616 ± 752400, Rs. 50495 ± 5139, Rs. 48835 ± 5939, Rs. 25265 ± 4302, Rs. 5536 ± 1043, Rs. 97966 ± 18826 and Rs. 8017 ± 1467 respectively. The total variable cost was Rs. 1207427 ± 207571.

In table 3, when considering correlations of variable cost of farms in Junput Khuti, it is seen that there is significant (1% level) moderate positive correlation between raw fish price and salt price, significant (5%) moderate positive correlation between raw fish price and temporary shed, significant (1%) high positive correlation between raw fish price and labour charge, significant (1%) high positive correlation between raw fish price and total variable cost. It was also seen that a significant (1% level) moderate positive correlation between salt price and transportation cost, significant (1%) high positive correlation between salt price and temporary shed, significant (5%) moderate positive correlation between salt price and labour charge, significant (1%) high positive correlation between salt price and total variable cost. Further, it was seen that there is significant (5% level) moderate positive correlation between transportation cost and temporary shed, significant (1% level) high positive correlation between transportation cost and labour charge, significant (5% level) moderate positive correlation between transportation cost and total variable cost. Table 4 also depicted that a significant (5% level) moderate positive correlation between temporary shed and electricity charge, significant (5% level) moderate positive correlation between temporary shed and labour, significant (5% level) moderate positive correlation between the temporary shed and total variable cost. In case of electricity charge, it was seen that there was a significant (5%) moderate positive correlation with labour charge. It was also seen that between labour charge and total variable cost there was also a significant (5%) high positive correlation (Fig. 1 and 2; Table 1).
Questionnaires and Data Collection

- Questionnaire Interviews
- Participatory Appraisal Tools such as FGD
- Key Informants Interviews

**Fig. 1** Capital cost of Junput Khuti

![Bar chart showing capital costs](image)

**Fig. 2** Variable cost of Junput Khuti

![Pie chart showing variable costs](image)
Table 1: Average economics of Junput khuti and their ratio analysis (Unit: Rs.)

| Particulars                                | Junput       |
|---------------------------------------------|--------------|
| Area of Khuti (bigha)                       | 1            |
| area of farm (Sq. metres)                   | 1337.8       |
| Construction of cemented tank               | 15901        |
| Construction of bamboo rack                 | 26751        |
| Land and farm equipment                     | 5875         |
| Miscellaneous                               | 3894         |
| Total capital cost                          | **52421**    |
| Raw fish price                              | 971313       |
| Salt price                                  | 50495        |
| Transportations cost                        | 48835        |
| Temporary shed                              | 25266        |
| Electricity charges                         | 5536         |
| Labour charges                              | 97966        |
| Miscellaneous                               | 8017         |
| Total variable cost                         | **1207428**  |
| Depreciation on capital cost @ 10%          | 5242.09      |
| Interest on capital cost @ 11%              | 4765.54      |
| Interest on variable cost @ 11%             | 109766.18    |
| Total fixed cost                            | **119774**   |
| Total cost                                  | 1327202      |
| Total dry fish produce (5 months)           | 13490        |
| Average price                               | 110          |
| Gross revenue                               | 1758227      |
| Net revenue                                 | 431025       |
| Operating Ratio (OR)                        | 68.67%       |
| Fixed Ratio (FR)                            | 6.81%        |
| Gross Ratio (GR)                            | 75.49%       |
| Net operating income                        | 550799       |
| Net profit                                 | 431025       |
| Input output ratio                          | 0.63         |
| Profitability ratio                         | 0.36         |
| Net profit ratio                            | 0.25         |
| Productivity Index                          | 132%         |
| Per kg. production price                    | 98.38        |
Table 2 Correlation matrix for average economics (unit 1 bigha) in connection with capital cost of dry fish industry considering all the involved parameters in Junput khuti

|                      | Construction of cemented tank | Construction of bamboo rack | Land and farm equipment | Miscellaneous | Total capital cost |
|----------------------|-------------------------------|----------------------------|-------------------------|---------------|--------------------|
| Construction of cemented tank | 1.000                        |                            |                         |               |                    |
| Construction of bamboo rack      | -0.515                       | 1.000                      |                         |               |                    |
| Land and farm equipment         | -0.172                       | 0.095                      | 1.000                   |               |                    |
| Miscellaneous                 | -0.285                       | 0.457                      | 0.315                   | 1.000        |                    |
| Total capital cost             | 0.946**                      | -0.230                     | -0.057                  | -0.091       | 1.000              |

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3 Correlation matrix for average economics (unit 1 bigha) in connection with variable cost of dry fish industry considering all the involved parameters in Junput khuti

|                      | Raw fish price | Salt price | Transportation cost | Temporary shed | Electricity charges | Labour charges | Miscellaneous | Total variable cost |
|----------------------|----------------|------------|---------------------|-----------------|---------------------|---------------|---------------|---------------------|
| Raw fish price       | 1.000          |            |                     |                 |                     |               |               |                     |
| Salt price           | .776**         | 1.000      |                     |                 |                     |               |               |                     |
| Transportation cost  | .614           | .782**     | 1.000               |                 |                     |               |               |                     |
| Temporary shed       | .705*          | .869**     | .745*               | 1.000           |                     |               |               |                     |
| Electricity charges  | 0.476          | 0.540      | 0.591               | .723*           | 1.000               |               |               |                     |
| Labour charges       | .809**         | .660*      | .829**              | .661*           | .715*               | 1.000         |               |                     |
| Miscellaneous        | 0.366          | 0.335      | 0.504               | 0.555           | 0.439               | 0.381         | 1.000         |                     |
| Total variable cost  | .996**         | .802**     | .677*               | .741*           | 0.530               | .852**        | 0.395         | 1.000               |

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

c. List wise N=10
**Table 4** Correlation Matrix for Average Economics (unit 1 bigha) in connection with Fixed Cost of dry fish industry considering all the involved parameters in Junput khuti

|                       | Depreciation on capital cost @ 10% | Interest on capital cost @ 11% | Interest on variable cost @ 11% | Total fixed cost |
|-----------------------|-------------------------------------|---------------------------------|--------------------------------|------------------|
| Depreciation on capital cost @ 10% | 1.000                              |                                 |                                |                  |
| Interest on capital cost @ 11%        | 1.000''                             | 1.000                           |                                |                  |
| Interest on variable cost @ 11%       | -0.120                              | -0.120                           | 1.000                          |                  |
| Total fixed cost             | 0.028                               | 0.028                           | .989''                         | 1.000            |

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N=10
Model 1: Revealed with the stepwise method of regression

Total Variable Cost (T.V.C) = 4559.19 + 1.031 X Raw fish price + 1.993 X Transportation cost + 3.416 X Electricity charges + 0.616 X Labour charges + 0.964 X Temporary shed

The equation clearly indicates that the most important variables (average value calculated for 1 bigha in all the cases) are raw fish price, transportation cost, electricity charges, labour charges and temporary shed which showed positive impact upon variable cost. By observing adjusted R² value, it can be concluded that both parameters explain 100% variability in total variable cost.

Fixed costs

The fixed cost for Khuties includes depreciation on fixed costs (@ 10%), interest on capital costs (@ 11%) and interest on variable costs (@ 11%). The values were Rs. 5242± 1460, Rs. 4765± 1328 and Rs. 109766± 18870 respectively and the total fixed cost was Rs. 105130 ± 15686.

Model Revealed with stepwise method of regression

Total fixed costs (TFC) = 0.086 6 + 0.999 x interest on variable costs + 1.909 depreciation on capital costs

It is seen that there is a significantly high correlation (1%) between interest on capital costs and depreciation on capital costs and interest on variable costs and total fixed costs in table 4. The equation clearly indicates that the most important variables (average value calculated for 1 bigha in all the cases) interest on variable costs and depreciation on capital costs which showed positive impact upon Total fixed costs. By observing adjusted R² value, it can be concluded that electric both parameters explain 100% variability in total fixed cost.

Shifting from an underdeveloped sector towards a promising sector, first of all, it requires the attention of the government towards both the fishery and fishers related to the industry. In case of fishery it requires a sustainable policy starting from the procurement of fishes, up-gradation of the process maintaining the hygiene and the quality of the product through branding along with an appropriate marketing opportunity free from intervention of the middleman. Credit facility side-a-side insurance schemes may be incorporated to safeguard the fishers. As women’s participation had the lion's share of the process, different measures related to health, education of the children, sanitary condition, safe and quality accommodation is of utmost importance towards the growth of the industry. With a synergistic effect of the above clauses obviously, make a turn of the industry towards the prosperity of both the industry and its allied community in near future meeting up the protein security of the underprivileged humanity of the country.

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