Economic analysis of commercial processing of fermented fish product (Matka shidal) and its marketing in North-East region of India

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ABSTRACT

Shidal is a traditional fermented value added fish product highly demanded by the people of NE region. This study aimed to highlight commercial processing methods, cost and margin in processing of Matka shidal and constraints faced by the processors of Sidal. This study was conducted by collecting information of 28 processors of Tripura and 8 processors of Manipur through focussed Group Discussion (FGD). Commercial shidal processing includes procurement of dry fish, sorting and grading, curing of Matka, filling, sealing and marking of Matka, storage of for fermentation and trading of Shidal. The cost-benefit analysis of shidal indicated net return of ₹ 77065.31/t and ₹ 52593.8/t in case of puthi shidal in Manipur and Tripura, respectively. Whereas, the net return in Baspati in Tripura was ₹ 59616.17/t. The percentage shares of producer in consumer’s rupee were ranged between 55-64%. The small scale processing units of fermented value added fish product shidal in Tripura and Manipur have greater potential and employment opportunities which can be exploited through development of better financial, technical and input support system.

Keywords: shidal, commercial processing, cost and margins, marketing, North-East region

Fermentation is one of the oldest and most economical methods for preserving food. In addition to preservation, fermented foods can also have added benefits of enhancing flavour, increasing digestibility, improving nutritional and pharmacological values. Shidal is a fermented value added fish product very popular in NE region. It is a indigenous fish product highly demanded in NE region of India, because of its typical flavour and aroma it is liked for its strong flavour (Majumdar et al., 2009). This product is popular with different local names such as Shidal, Sepaa and Hidal in Assam, Tripura, Arunanchal Pradesh and Nagaland and Ngari in Manipur (Muzaddadi and Basu, 2012). The production and consumption of this product is mainly confined to NE region, however small proportion of Shidal is also imported from Bangladesh. The technology of its preparation is very old. It is originated in the erstwhile
undivided India (now Bangladesh). A good number of research studies have been highlighted various aspects related to shidal and other fermented fish products of NE region such as assessment of nutritional quality of shidal (Majumdar et al., 2009); indigenous processing method and quality control of shidal, Comparative study of fermented fish products of Northeast India (Seedal and Shidal); extension of shelf life of shidal (Muzaddadi and Basu 2012; Muzaddadi, 2013, Mahanta and Muzaddadi, 2013). Microbial profile of starter culture fermented fish product 'Ngari' (Sarojnalini and suchitra 2009), Indigenous knowledge on processing of ‘Godak’-a delicacy of the tribal population in Tripura and its nutritional quality (Dhar et al., 2012), Production process, nutritional composition, microbiology and quality issues of shidal (Ahmed et al., 2016); micro-organisms and the nutritive value of traditional fermented fish products of Northeast India ( Kokati and Goswami, 2013). Traditional fermented foods of Manipur (Jeyaram et al., 2009), (Ngari: an indigenous fermented fish product from Manipur( Singh et al., 2010), Phassya Shidal (Anon, 2007). However the information on commercial aspect of this highly demanded indigenous fermented fish products of NE region are scanty, therefore a study on Commercial production Fermented Fish Product (Shidal) and its marketing in NE Region has been attempted and findings of the study are presented in this paper.

**Methodology**

This study has been conducted including two states such as Tripura and Manipur. From Tripura altogether 28 processors and from Manipur altogether 8 processors of Matka Shidal have been selected. The processors were interview for collecting information on scale of processing, processing method, varieties/qualities of shidal processed sources of raw material, quality control, marketing etc. Further the Information from wholesalers, retailers who engaged in trading were interviewed for collected the information on varieties of Matka shidal, their prices and socioeconomic conditions of the Labourers engaged in shidal processing and also the problems and prospects of shidal processing have been gathered through personal interview.

Average revenue of Shidal Processor (₹/month) =

\[ \sum (Q_{ij} \times P_{ij})/n \]  

Where,

- \( Q_i \) quantities of \( i^{th} \) qualities Shidal sold by \( j^{th} \) processor in a month
- \( P_i \) is the price received by \( j^{th} \) processor for \( i^{th} \) quality of Matka shidal

Average operational cost of Shidal processing (₹/month)=

\[ \sum (C_{ij} \times I_{P_{ij}}) \]

\( C_{ij} \) = physical quantities of \( i^{th} \) item by \( j^{th} \) processor
\( I_{P_{ij}} \) = Input price of \( i^{th} \) item for \( j^{th} \) processor

Further the monthly average revenue and average cost for shidal processing have been converted into per tonnes basis and net income and percentage margin of the processor was calculated as-

Net income (₹/t) =

\[ \text{Total revenue} - \text{Total cost} \]

Percentage Net income =

\[ (\text{Net income} / \text{Total revenue}) \times 100 \]

**Results and Discussion**

**Varieties of Matka Shidal**

In the dry fish markets of Tripura two major categories of Matka shidal were found to be marketed with the trade name punti shidal and Physsa Shidal/Baspati Shidal. Both products differs in terms of fish species utiled for preparing these products. Punti shidal is prepared with small size freshwater fish Puntius sp (Muzzaddadi, 2012). Whereas, the Baspati shidal is prepared with low priced fish Setipina phasa. Both products differ in quality and price.

However it was recorded that within these two products range of grades which varies in terms of quality and price are processed and traded in the market.
Purchase of Raw material

The two types of fishes utilized for preparation of Matka shidal such as Puntius species and Setipina phasa which are abundantly available during monsoon and post monsoon. The raw materials generally procured from various source markets of Bangladesh or Jagirao dry fish market of Assam and also in some cases processors directly import from the production and drying centres located in Orissa, West Bengal and Uttar Pradesh. During the season these fishes are procured in bulk quantity and stored for utilizing in regular processing of Shidal.

Method of Shidal Processing

To make “Matka shidal” processors need several infrastructural facilities like storage for raw material and sorting and grading space, Processing shed and shed for putting Matka for fermentation etc. as well as some basic items like earthen pot (Matka), Fish (Telesh and Puthi), Oil, Salt, Labor, baskets etc. In addition to this there should availability of regular availability of raw materials, availability of clean water and any source of water and market for shidal. The processing of shidal is mainly confined to six months (November to April) in a year. However the fermentation, procurement of raw material and sale of shidal are continued to whole year.

Step 1: Sorting and Grading: The cleaning, sorting, grading are important value addition activities performed before processing, packing and storage for fermentation (Fig. 1). At this stage fishes are cleaned from broken, scales and dusts and further graded based on size, colour, moisture content and appearance etc. Puntius species in uniform and relative bigger size with no insect infection is desirable quality of raw material for preparation of punti shidal (Arman 2012). However, it is observed that fishes are graded according to size and other quality parameters for preparing different grades of Shidal. The daily paid women are engaged for the purpose of sorting and grading of fishes.

Step 2. Preparation of Oil processed Matka: Processing of earthen pot (Matka) is essential and important for shidal preparation (Fig. 2). The new earthen pot Matka purchased from the market and each Matka cost ₹ 300. The edible oil is used for smearing inside and outside. Though the fish oil is recommended for better quality of Shidal (Muzaddadi and Basu, 2012) but it was found that shidal processors of Tripura and Manipur used Mustard oil for processing of shidal at commercial scale may be because of low cost involved in it. The oil is polish on both side of Matka is repeated three times and allowed to sun drying for five days so that Matka get fully saturated. The pot thus prepared does not allow any air or moisture to pass through the pores of earthen wall.

Fig. 1: Sorting of dry fish for shidal preparation in Tripura
Approximately 700gm oil is needed for curing of Matka with oil. During discussion with the processors it was opined that the oil polish close the pores and make it more air tight further it helps in retaining the required moisture of fishes inside the Matka.

**Step 3: Water soaking of Dry Fish:** In commercial processing of shidal it is an important step. The sorted and graded fishes used for water soaking. Soaking eliminates wastes, reabsorbs water, softens up the fishes and it provides optimum moisture for the fermentation. In this method bamboo basket filled with fishes dipped into clean water for about 2-3 minute and evening period was reported most suitable because low temperature and filling of the Matka in early morning (Fig. 3). After soaking in water these fishes are spread on bamboo mat for whole night so that excess water drained. The time period for water soaking is critical, and excess water soaked fishes are considered to be
unsuitable for fermentation hence they are discarded during processing.

**Step 4: Filling of Matka:** After soaking at evening next early morning oil treated Matka filled with soaked fishes. Morning is more suitable because of lower temperature. The processor, had special shed for filling of Matka, for preparing shidal matka has to be filled with maximum possible quantity of fish, hence while filling it, after each layer it covered with cloth and pressed with leg (Fig. 4). However during this process precautions are taken so that shape of fish should be remain intact but the each layer pressed by applying uniform pressure by hand or leg. Further for this process as it is observed from the picture that the half portion of earthen pot (Matka) is buried underground in order to avoid breaking of Matka due to packing pressure. Such spreading of fish and subsequent manual compaction is continued until the layers reach the neck region. The gunny bags layed surrounding the Matka to avoid wastage of fishes. All these are skilful tasks performed by highly skilled labourers on contract basis.

**Step 5: Preparation of Cover paste and Sealing of Matka:** One paste are prepared with mixture of dry fish (Telash Kanti) which contains relatively more oil, salt and edible oil. The total quantities of these ingredients for filling of 10 Matka are 7 Kg of dry fish, 500ml of mustard oil and 500gm of salt. These ingredients are mixed together prepared a paste. Thickness of paste in at the neck of Matka maintained 1″ or about 500 gm paste is used in Matka. It is also important that this paste is to be prepared during filling of Matka with fishes otherwise its quality gets deteriorated and is not suitable for sealing of Matka (Fig. 5).

**Step 6: Sealing of Matka with Clay:** After completion of first step of sealing of Matka by paste, the paste is covered with polythene. Thereafter a thick layer of clay used sealing of Matka.

**Step 7: Storage of Matka for fermentation:** Once the Matka is completely sealed with clay, it is coded/markd with paint to indicate trademarks, quality/grades, expected period for opening of Matka. These codes help to the processors in signalling the trade name, deciding prices and salting whole Matka without opening it. It was also noticed that the in case of some big processors of shidal, typical shape and size of maktta indicates their trade marks. The Matka are stored under shed in cool place and during storage sometimes the half of the Matka buried underground for fermentation (Fig. 4).
average period for fermentation is about 4-6 months. However the processor was reported that they store it for minimum 1.5 months to maximum 1.5 years, it all depends on quality of shidal processors’ desired to prepare. The processors perceived that longer storage for fermentation leads to better quality of shidal. However it is also to be mentioned that during sorting, grading and filling of Matka, duration of fermentation and quality of shidal to be prepared is decided by the processors. The processors were found to be charged different prices for different grades of shidal based on their quality.

Cost and margins of processors in Matka shidal: Since shidal is widely demanded fish product in the North East Region, therefore processors, process it in bulk quantity to meet out the market demand. In Tripura two varieties of shidal such as puthi shidal and bashpati shidal are processed and marketed. Both value added products are differs in raw materials and baspati shidal is low priced value added products which is becoming popular and close substitute of puthi shidal particularly for the consumers having lower affordability.

The cost and margin in processing of Matka shidal has been worked out and it was found that calculated for the processors of Tripura and Manipur (Table 1). The total variable cost processing of puthi shidal in case of Tripura was ₹ 213647.5/t where as it was ₹ 285129.99/t in Manipur. Further the cost of processing of Baspati shidal in shidal was worked out to be ₹ 231344.43/t. The
cost of processing of Baspati is lower because of lower purchased price of fishes used for processing Baspati Shidal. Out of total variable cost, cost of raw material or dry fish utilized for processing was accounted about 90 % and remaining 10% was accounted by transportation cost of raw material, loading and unloading, cost of mustard oils used for curing the Matka and preparation of paste and labour cost. The gross returns in puthi shidal in Tripura was ₹ 266241.3/t in Manipur it was ₹ 3,62,195.30/t whereas in case of Baspati in Tripura it was ₹ 231344.43/t. The net return in processing of puthi shidal in Manipur was ₹ 77065.31/t whereas it was ₹ 52593.8/t in Tripura. However, net return in Baspati in Tripura was ₹ 59616.17/t. The net returns over variable cost in processing of two varieties of shidal in the two states turned out to be 20-26 % of Total revenue. These results clearly indicates that the shidal processing is economically viable. The commercial processing of shidla also provides gainful employment to the women and rural youth.

Marketing of Shidal: The fermented value added fish products are traded in whole North East region. This product is traded through the channels of Dry fish products. Hence the Shidal and Dry fish products are having the similar marking chains and trading centres in the NE region. It is observed that in some cases the processors are also functions in the market as wholesalers/traders. The processors sell their produce the wholesalers, retailers and in some cases they trade it

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<th>Table 1: Cost and margin of processors of Matka shidal in Tripura and Manipur</th>
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<td><strong>Cost/return (₹/t)</strong></td>
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Figures in parentheses indicate percentage or total
to the wholesalers of the distant markets within the state or outside the state. Since the processors are also acts as wholesalers so they are better informed about market prices and market demand for the products. The price formation in marketing channel of Shidal is presented in the Fig. 7. It is indicated by the figure that the prices of the Baspati shidal/physsa shidal is lower as comparision to the puthi shidal. It is also reflected that the percentage shares of processor in consumer’s rupee was 55% in case of puthi shidal whereas it was 64% in case of Baspati shidal. Remaining 36-45% is distributed as gross market margin of wholesalers and retailers of shidal.

![Fig. 7: Average price (₹/Kg) of fermented products different level of market chain in Tripura](image)

**Constraints:** Though the processing of shidal at commercial scale is found to be economical but several issues were recorded during the study. The shidal processing involved initial investment for creating infrastructures such as storage of dry fish, shorting and grading shed, processing sheds, fermentation shed, trading shop. It also required regular fund for procuring inputs such as dry fish, Matka, oil, salt, bags, and payment of labourers. Therefore financial support and micro financing services are considered to be crucial for processors of Matka shidal. However it was noticed that even the processors had better transactions with banks, they are not having credit facilities suited to them such as short term credit with minimum formalities and easy repayment plan. This is a major impediment in increasing scale of processing of shidal. Further the lack of regular supply of dry fish as their demand is also found to be constraint in processing of Matka shidal. The availability of skilled labourers for processing, increasing cost of Matka, lack of cost effective technologies like reduction quantity of oil used for curing of Matka, low cost fermentation pot, reduction in fermentation period etc. are some of the barriers in increasing processing and trading of shidal at large scale.

**Acknowledgements**

The authors of this paper are highly thankful to the NABARD, Mumbai for financial support for conducting a study on “Socioeconomic Aspect of Value Chain Analysis of Dry Fish in North East Region of India” because some part of this paper is adopted from the study. Further the supports and guidance received from Dr. Pramod Kumar Pandey Dean College of Fisheries, CAU Lembucherra is duly acknowledged.

**Conclusion**

The Matka shidal, a traditional fermented fish product quite popular among the fish consumers of North East Region of the country. The typical method of processing of shidal required alot of caution and it required highly skilled personnel for making Matka shidal. The processing of shidal at commercial level is confined to only few places of Tripura, Assam and Manipur and it is traded to almost every remote corners of the whole NE region. The cost and benefit analysis of commercial processing of shidal was indicated as profitable venture and it also provide gainful employment to the poor people. The small scale processing units of Tripura and Manipur have greater potential for production as well as trade of Shidal provided they receive better financial, technical and input support system.

**References**


508
Economic analysis of commercial processing of fermented fish product (Matka Shidal) and its marketing


